REPORT

OF THE

DIRECTOR-GENERAL OF FORESTS

FOR THE YEAR ENDED

31 MARCH 1972

Presented to the House of Representatives
Pursuant to Section 68 of the Forests Act 1949

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THE DIRECTOR-GENERAL OF FORESTS

to the Hon. D. MACINTYRE, Minister of Forests

Wellington, 26 June 1972.

SIR,

I have the honour to present, pursuant to section 68 of the Forests Act 1949, the annual report of the operations of the New Zealand Forest Service for the year ended 31 March 1972.

I have, etc.,

A. P. THOMSON, Director-General of Forests.

Hon. D. MACINTYRE,
Minister of Forests,
Wellington.

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STATISTICAL SUMMARY—IMPERIAL MEASURE

Category	Year Ended 31 March	
	1971	1972
New Zealand Forest Service		
Forest revenue	$23,848,023	$26,859,840
Net cost of forest administration	$5,181,547	$5,655,222
Total area of State forest land	10,143,476 acres	10,081,917 acres
State exotic forest—		
Total stocked area	728,946 acres	758,172 acres
Planted during year	36,416 acres	32,156 acres
Areas restocked during year	8,899 acres	12,226 acres
Clear felled during year	10,884 acres	11,237 acres
Net increase in stocked area	28,995 acres	29,226 acres
Roundwood removed from State forests—		
Indigenous	19.0 million cu ft	18.5 million cu ft
Exotic	106.2 million cu ft	104.1 million cu ft
Total	125.2 million cu ft	122.6 million cu ft
Sawn timber produced*	55.3 million bd ft	55.4 million bd ft
New Zealand		
Area of exotic production forests	1,379,000 acres†	1,440,000 acres†
Net increase in stocked area during year	49,500 acres‡	61,000 acres‡
Roundwood removed from all forests—		
Indigenous	35.8 million cu ft	33.5 million cu ft
Exotic	253.6 million cu ft	247.8 million cu ft
Total	289.4 million cu ft	281.3 million cu ft
Number of registered sawmills	457	436
Sawn timber production—		
Indigenous	187.9 million bd ft	175.2 million bd ft
Exotic	596.4 million bd ft	565.3 million bd ft
Total	784.3 million bd ft	740.5 million bd ft
Sawn timber treated	N.A.	N.A.
Paper production	454,586 tons	461,382 tons
Wood-based panel production (estimated surface area)	192 million sq ft	200 million sq ft
Value of imports of forest products* (c.i.f.)	$26,868,000	$23,438,000
Value of exports of forest products (f.o.b.)	$71,235,000	$78,563,000

*Calendar year. †Estimated. ‡Provisional. N.A. Not available.

STATISTICAL SUMMARY—METRIC MEASURE

Category	Year Ended 31 March	
	1971	1972
New Zealand Forest Service		
Forest revenue	$23,848,023	$26,859,840
Net cost of forest administration	$5,181,547	$5,655,222
Total area of State forest land	4,105,065 ha	4,080,152 ha
State exotic forests—		
Total stocked area	295,004 ha	306,832 ha
Planted during year	14,738 ha	13,014 ha
Areas restocked during year	3,601 ha	4,948 ha
Clear felled during year	4,405 ha	4,548 ha
Net increase in stocked area	11,734 ha	11,828 ha
Roundwood removed from State forests—		
Indigenous	538 thousand m^3 (r)	524 thousand m^3 (r)
Exotic	3,005 thousand m^3 (r)	2,946 thousand m^3 (r)
Total	3,543 thousand m^3 (r)	3,470 thousand m^3 (r)
Sawn timber produced*	131 thousand m^3 (s)	132 thousand m^3 (s)
New Zealand		
Area of exotic production forests	558,000 ha†	583,000 ha †
Net increase in stocked exotic area during year	18,700 ha ‡	24,700 ha‡
Roundwood removed from all forests—		
Indigenous	1,013 thousand m^3 (r)	948 thousand m^3 (r)
Exotic	7,177 thousand m^3 (r)	7,013 thousand m^3 (r)
Total	8,190 thousand m^3 (r)	7,961 thousand m^3 (r)
Number of registered sawmills	457	436
Sawn timber production—		
Indigenous	443 thousand m^3 (s)	413 thousand m^3 (s)
Exotic	1,408 thousand m^3 (s)	1,333 thousand m^3 (s)
Total	1,951 thousand m^3 (s)	1,746 thousand m^3 (s)
Sawn timber treated	N.A.	N.A.
Paper production	461,859 metric tons	468,764 metric tons
Wood-based panel production (estimated surface area)	17.8 million m^2	18.6 million m^2
Value of imports of forest products* (c.i.f.)	$26,868,000	$23,438,000
Value of exports of forest products* (f.o.b.)	$71,235,000	$78,563,000

*Calendar year. †Estimated. ‡Provisional. N.A. Not available.

NOTE—ha=hectare(s)
m^3(r)=cubic metre(s) of roundwood
m^3(s)=cubic metre(s) of sawn wood

CONVERSION FACTORS
1 acre = 0.4047 hectares
1 cubic foot = 0.0283 cubic metres
424 board feet = 1 cubic metre

FOREST POLICY AND FORESTRY HIGHLIGHTS

BEECH FOREST MANAGEMENT

During the year the Forest Service presented a report to Parliament on the utilisation of South Island beech forests. The report honoured an earlier undertaking to make available to the public the facts and considerations relevant to proposals for a possible expansion in the utilisation of beech forests and a possible development of industries using this hitherto underutilised resource.

The report gave details of the location and size of three likely project areas and an assessment of the volumes of utilisable timber in each. The three areas concerned are a relatively small one in Nelson (45,000 acres—18,200 ha), a very large area on the West Coast (594,000 acres —240,400 ha), and one of intermediate size in Southland (200,000 acres—81,000 ha). Proposals were given for the subsequent management of the forests which could be utilised, together with information on the areas to be perpetuated as beech forests by natural regeneration, areas to be converted to exotic species, and areas where the management would be a mixture of the two, i.e., natural regeneration with some enrichment by the planting of hardwoods.

Of more importance the report concentrated on the effects of the management proposals on the beech forest estate of the South Island. It indicated the methods which had been adopted in classifying the forests into the three reserve categories of protection forests, amenity forests, and biological reserves, and quoted figures of the residual areas which could be considered available for utilisation.

As indicated in last year's annual report the Nature Conservation Council was invited to comment on the criteria adopted for forest classification and to inspect the areas on the ground. This the council did. Other organisations consulted were the Soil Conservation and Rivers Control Council, the five catchment boards concerned, the Forestry Development Council, the New Zealand Institute of Foresters, and the Royal Forest and Bird Protection Society. The Forest Service also sought specialised advice from appropriate divisions of the Department of Scientific and Industrial Research and from the Wildlife Branch of the Department of Internal Affairs.

The comments from these many organisations were generally factual and useful and most of them did not raise any major objections to the proposals. One notable exception was the Royal Forest and Bird Protection Society, which strongly opposed the replacement of beech with exotic forests, although it did not object to the use of beech forests provided they were regenerated. In an interim report the Nature Conservation Council agreed that beech could be managed as a renewable resource and, although expressing definite reservations about some other aspects of the proposals, in general it accepted the policy and management plans recommended by the Forest Service, including the proposals for partial conversion to exotics. The final report of the Nature Conservation Council is not yet to hand.

Otherwise criticism centred round the need for a greater research effort as a basis for delineating reserves, for gauging the effects of logging on soil and water values, and for predicting the ecological effects of large-scale conversion to exotic species. The Royal Forest and Bird

Protection Society and the recently formed conservation organisation COENCO both claimed that enough open land was available for planting without encroaching on existing forests. The parliamentary report pointed out that the Forest Service does acquire and plant open country but that the beech proposals envisage the use of resources already on the ground, thus enabling new industries to start much earlier. However, a much wider issue of principle is involved. The Forest Service believes that even if there were enough open land of suitable location for current needs, this would not of itself be a compelling argument to justify the permanent retention of every acre of existing lowland beech forest. Its approach to zoning and reservation has been to consider for utilisation only those areas where other values—protective, scenic, recreation, and scientific—are not demonstrably more important. It has taken the view, as a matter of rational and optimum land use, that where these values are not of paramount importance it is in New Zealand's interest to put the land into full and maximum production, whether this be in grass or in trees. New Zealand's land base is not so large that it can afford to sterilise land which has a production potential and is not required for other purposes.

The Nature Conservation Council's final report will be studied, and recommendations should soon be made as to whether or not it is deemed desirable on environmental grounds to proceed with either the Southland or the West Coast schemes or both. It has been suggested that decisions could be delayed until more evidence of side effects is available, a suggestion which certainly merits full consideration.

COMBINING FORESTRY AND FARMING

Apart from the use by some farmers of neighbouring virgin or cut-over indigenous forests for rough grazing or run-off, grazing within forests has not in New Zealand been an integral part of forest management as it has been in some other countries. True, from time to time the Forest Service has grazed stock on firebreaks, has used sheep to reduce the cost of releasing trees that have been planted into grass, has likewise used cattle to reduce the cost of clearing cut-over native bush about to be replanted, has grazed stock under older larch stands where good swards of grass have developed, and has helped solve local problems of winter or summer feed shortage by allowing cattle to browse on the indigenous understorey of maturing exotic forests. But these practices have all been incidental and subsidiary to forest management; there has not previously been a deliberate attempt to combine forestry and farming continuously on the same acre, to the benefit of both.

It has taken the private sector, in the form of imaginative and resourceful farm foresters and some of the small afforestation companies, to give an indication of just how practicable and profitable this type of farm forestry could prove to be. This, perhaps, is not surprising for its success must depend primarily on good stock management, a skill which few foresters can be expected to possess. Recently two influences have emerged which have combined to focus national attention on the

techniques which the private sector has evolved and to make them very much the concern of the Forest Service and the large companies, certainly in the research field and possibly in the management field as well.

The first influence is the forestry trend, referred to on page 12, towards short rotations combined with light initial stockings and early heavy thinnings or both. Grass production under more open stands should enable good early yields to be obtained from grazing of livestock. At the same time other tangible forest-management benefits should accrue, particularly cheap and effective weed control, better fire protection, simplified mensuration, and easier access for silvicultural and other operations. If short-rotation forestry should prove to be profitable, it can probably be made even more so by ensuring the fullest utilisation of the site through the deliberate encouragement of grass which is subsequently either harvested for forage or grazed. There is scope for applying this concept to marginal compartments of State forests which adjoin development farm land.

The second influence which has encouraged interest in a combination of forestry and farming is the declining profitability of sheep farming, particularly on some marginal hill country farms where there is a risk of much hard-won grassland reverting to scrub. Here forestry offers a means of possible diversification and of gradual land use changes which do not entail writing off the capital improvements already existing. Indeed one of the greatest advantages of any form of intimate mixing of forestry and farming is that much of the essential capital development for forestry in the form of roading, housing, and other amenities is already present. For these reasons the farming community itself is looking increasingly at the possibilities of joint farming and forestry operations.

A great deal has still to be learned. We know little as yet of the grazing behaviour of animals of various ages in a forest environment; of the best pastures that can be grown in partial shade; of the degree of damage young trees can tolerate; of the optimum silvicultural regime which will minimise the rotation period; of the stage at which the formation of the forest canopy will tend to suppress pastures; and, most important, of the economics of the whole operation. To find out these and other things the Forest Research Institute, in conjunction with the Department of Agriculture and individual property owners, has embarked on a comprehensive research programme. Experiments are being carried out on planting trees into established pastures, and alternatively on establishing grass under trees already planted into fern and scrub.

The other approach to joint forestry and farming is not to combine them on the same acre, but to develop a more closely planned and intricate pattern of forests and grass with intensive forestry and intensive grassland management practices in each. Once again the approach is particularly significant on properties which have become or are becoming sub-marginal for conventional sheep farming. This was the original concept for Esk Forest in Hawke's Bay but was never carried out. It has been practised in part on a few private properties throughout the country. Again in conjunction with the Department of Agriculture, investigations are being carried out into combining several sub-marginal properties into one unit and subsequently managing them as joint farming and production forestry ventures. This approach appears to have good chances of being successful economically. It will probably be combined with the other already mentioned.

It would be good to see New Zealand's soils and climate producing the optimum economic combination of beef, dairy products, lamb, wool, fruits, grains, other crops, and softwood and hardwood wood fibres. Such an optimum economic combination is likely to be extremely pleasing aesthetically and at the same time conducive to the development in all respects of a healthy social and physical environment.

FORESTRY DEVELOPMENT PLANNING

The harmonious and worth-while liaison between State and private agencies and organisations concerned with the development of forestry in New Zealand has been greatly enhanced through their participation in the activities of the Forestry Development Council (FDC) and its working parties. Mention is made on page 13 of the successful culmination of 2 years' arduous and thorough investigations by the stumpages working party.

Tribute should be paid to the successful outcome of the FDC recommendation for an increased national planting target, announced at the National Development Council conference of March 1972. This recommendation was for the gross new-planting target to be lifted from 57,000 acres (23,000 ha) to 70,000 (28,300 ha) a year to allow increased wood production from existing old-age-class forest over the next decade. The supporting reasons and arguments given resulted from joint planning and investigations by Forest Service and private industry representatives on the Targets Working Party of the FDC. This illustrates well the continued benefits that may be expected in the sound planning of forestry development through the combining of State and private forestry expertise on the work of the council.

The decision to increase planting targets is extremely important for its short-term as well as its long-term effects. In 1969 the Forestry Development Conference set production and export targets for 1972–73 and 1978–79. The 1972–73 targets have already been reached, 2 years ahead of schedule. Recently the NDC requested all sectors to review their forward targets in the hope that some sectors, including forestry, would be able to make good the shortfall expected from agriculture. A revision of the New Zealand Forest Service's 1969 national forestry planning model showed that it would be possible to manipulate New Zealand's mature exotic resources so as to permit an immediate increase in production (and in export) without further aggravating the expected reduction in the rate of growth for long-term wood supplies. This could, however, be done only if there were an immediate and substantial increase in new planting in selected localities. Specifically the decision to lift the planting target from 57,000 acres to 70,000 acres a year, at an annual initial cost to the nation of only $1 million, means that annual export earnings can be increased by no less than $11–$12 million. By 1981–82 the increased forestry export earnings should be at least $27 million per annum and could be considerably higher, depending on the product mix available for export. The increased industrial processing capacity necessary for this growth is being established now; the export markets for most, if not all, of our products are assured; the surplus

wood supply is already on the ground; and the faster rate of cutting over the next few years can be made good by the extra planting programme grown as short-rotation crops.

Thus forestry demonstrated that it was one of the few sectors able to increase production in the short term without jeopardising continuing growth rates in the future. The exercise demonstrated also that in a situation where there is a surplus of mature exotic forests it is possible to generate increased returns from the invested forest capital through an immediate modest initial investment in additional planting. The flexibility this provides in forest management allows marketing opportunities to be realised as they become available.

PLANTING PROGRESS

Last year's report discussed the financial necessity of choosing carefully between the alternatives of investment in planting to produce large volumes of relatively low-quality wood and investment in pruning and thinning to produce lesser volumes of better-quality wood. In facing this dilemma the planned planting programme for 1971 was substantially reduced in comparison with the previous year's. This had the effect of lowering the morale of field staff and also provoking extremely adverse comment from many regional interests. Feeling in Northland was so strong that a group of citizens, to offset part of the regional reduction, contributed physically and financially to the extension of Aupouri State Forest.

Despite the initial forebodings, however, the planting programme was exceeded by some 50 percent—the additional acreage being planted largely in relief of unemployment, using funds provided by the Department of Labour. Over 32,000 acres (12,900 ha) of new State planting was done.

Winter unemployment would be difficult to avoid without afforestation schemes to balance summer labour-intensive occupations, particularly in Auckland, Wellington, and Southland conservancies, and forestry thus plays an important role in social and economic stability. Unfortunately the location of seasonally unemployed labour does not coincide completely with the most desirable regional allocation of new planting effort as determined in national planning models.

It is important that a basic Forest Service planting target be established; that it is continuously approved 3 years in advance to avoid land lying idle and wastages in preparation for planting and in tree-stock production; that it is based primarily on national targets approved by the National Development Council (NDC) and translated to specific regional proposals, likewise NDC-approved; and additionally that it makes adequate allowance for the social, political, and protective roles that State planting is required to fulfil.

Planting by the private sector, primarily the large companies, continued to grow spectacularly, but again the regional contribution was somewhat uneven and not always closely related to recognised targets. This growth is nevertheless extremely encouraging and if complemented by a State effort to provide regional balance it will allow forestry sector accomplishments to match plans with a high degree of precision. Two

proposals for new large-scale private development have been mooted in the North Island, and the area planted by small forest growers under the two forestry encouragement schemes rose this year by 90 percent (see page 21). Increasing interest in forestry is being shown by the independent private investor. This interest, based on observed industrial development, is not of the questionably speculative type that characterised much of the private planting of the 1920s and 1930s.

The total contribution from the private sector is estimated to be some 39,700 acres (16,100 ha), making a national new planting total of some 71,800 acres (29,100 ha). This represents a net gain in effectively stocked area of nearly 60,800 acres (24,600 ha). The figures are in line with the revised planting targets put forward by the Forestry Development Council to the Targets Working Group of the NDC. They are the highest for 40 years and, although short of the desirable total of 80,000 acres (32,400 ha) suggested in last year's report, constitute very good economic progress.

A significant feature of new planting has been the consideration given to making exotic forests aesthetically pleasing, especially where viewed from main roads. A varied species composition is an important aspect of this work and steps are being taken to extend the effort to plantations of all tenures.

SHORT ROTATIONS FOR RADIATA PINE

The old crop of radiata pine planted during the 1920s and 1930s and largely untended due to shortages of labour during the war years has formed the basis of the rapidly expanding forest industry. These older stands provide raw material for the manufacture of pulp, paper, chipboard and plywood, and also produce acceptable saw logs from which most of the country's timber is produced. Experience has shown that by pruning and thinning either better-quality timber can be produced or timber of equivalent quality to that currently available can be produced more quickly.

From the early 1950s considerable attention has been focused on determining the most appropriate silvicultural treatment for radiata pine, and on the results of mill studies of trees from stands treated under different regimes. It has become increasingly apparent that this flexible species permits a wide range of silvicultural practices and that its fast growth rate provides the opportunity for even earlier financial benefits than have been achieved to date.

Early silviculture has been greatly influenced by European practice and teaching. The fundamental concept of this approach is to hold stands tight early in the rotation to restrict branch size, with frequent light thinnings to maintain growth on the final crop trees. Repeated light thinnings have not been economic in New Zealand, and the planned silvicultural regime has usually consisted of one or two thinnings without recovery of wood, and one, two, or occasionally three production thinnings. Further studies have shown that in some situations commercial thinnings may not be economically desirable, because holding stands until they reach marketable sizes reduces growth on the final crop trees, resulting in smaller logs which may be more expensive to saw

and which will produce poorer grades of timber. Moreover, thinnings have been difficult to quit in some areas. These findings are not universally applicable and are certainly not wholly relevant where the overwhelming consideration is to produce the maximum volume per acre.

What has been demonstrated beyond doubt by economic studies is that the best monetary returns for saw log production are obtained if the young stands are pruned for clear wood and thinned early and heavily. This ensures that almost all growth is concentrated on the best-formed trees, which are selected to remain until the final felling. The larger logs and high proportion of clear wood contribute to the high values which may be expected, while a saw log rotation of 25 years or less ameliorates the limiting effect of compounded costs on forest profitability. Short-rotation management allows a more positive expression of the objectives of growing wood for different product types and reduces such management risks as wind throw, disease, and the production of unmerchantable small and malformed stems. For pulpwood production, rotations could even be shorter than 25 years.

With the emphasis on early heavy thinnings the need for high initial stocking has been questioned, particularly since genetically improved trees of a more lightly branched type are now becoming available. The application of a silvicultural regime having an "open" character allows a considerable amount of undergrowth to develop beneath the tree crop. The possibility of grazing cattle on the undergrowth is a further advantage of short rotations and could lead to more intimate mixtures of grazing and forestry (see page 8). Control of undergrowth greatly simplifies thinning, pruning, and inventory operations and lessens risks of ground fires.

In many instances the productivity of land, the correct age-class distribution, the aims of the grower, or market opportunities will dictate whether a short-rotation regime can be successfully applied, or whether closer spacing, a minimum of tending, and perhaps longer rotations are more appropriate. In all probability a balance between these regimes will develop which will allow a wider range of wood types to be grown than is practicable from either past practices or short-rotation regimes alone. However, in the light of current knowledge of market opportunity and price differentials between timber grades regimes incorporating wider initial spacing and shorter rotations are likely to give the greatest economic return on much of the forest estate. The trend in New Zealand forestry is in this direction.

SELLING STATE-OWNED WOOD

"Stumpage is fundamentally the value of standing trees. It is therefore a subject of controversy between the forest grower, to whom the value represents an income, and the wood processor, to whom the value represents a cost." These are the opening words of the report of a working party set up by the Forestry Development Council (FDC) to determine criteria for fixing and reviewing stumpages for Government-owned wood, both indigenous and exotic. The working party first met in April 1970 and included representatives of the New Zealand Forest

Owners' Association, the New Zealand Sawmillers' Federation, the New Zealand Farm Forestry Association, the buyers and sellers of pulpwood, and the Treasury, with the then Deputy Director-General of Forests as the chairman.

The FDC set out detailed terms of reference requiring the working party to: deal with the basic questions of fixing and reviewing stumpages; consider what objectives a public agency selling wood to industry and for export should pursue; determine the extent to which the costs of afforestation should properly be charged to commercial forestry and what should be charged to the public for other benefits provided; investigate the possibility of improving the average return to forest owners by greater integration of wood-using industries; assess the effects that the sales of Government-owned wood may have on the sales of privately owned wood; consider appropriate terms of sale; and recommend the most suitable machinery for the settling of disputes arising from stumpage reviews.

With such a wide range of inquiries and the clashes of opinion that might be expected from the different interests represented, it appeared the working party had been given a nigh impossible task. It is pleasing to report that 10 meetings and 2 years later complete agreement has been reached on all issues of principle, and the report from the working party is unanimous in its proposals for important and fundamental changes to existing stumpage methods. The report has gone forward to, and been adopted by, the FDC. In due course it will be published, but because of wide interest and the importance of the matters agreed upon, a brief summary of the main conclusions is given here:

- For various reasons most sales of indigenous wood from State forests should continue to use the residual value formula for stumpage determination.
- The residual value formula is not recommended for the sale of exotic timber, partly because it is impossible to apply with any degree of precision, but mainly because in principle it is limiting on the profitability of industry.
- A stumpage based on the recovery of growing costs is likewise not favoured. There are many reasons for this, one of which is that the growing-cost approach is by definition limiting to the profitability of forestry.
- Wherever possible and other things being equal, stumpages should be determined by market values, provided a free and competitive market exists.
- In the absence of a free and competitive market, stumpages can be set only by negotiation. In negotiations, forest growing costs must be a major factor to be taken into account by the seller just as the inherent value of wood to industry must be a major factor to be taken into account by the buyer.
- Future sales of exotic wood should be of two major types: long-term sales to provide industry with a secured and regular volume of wood; and short-term sales to provide wood supplies to enable industry and the State to capitalise on short-term markets and opportunities, to help meet various management requirements, and to test markets.

- The criteria for deciding between different tenderers should be included as part of the sales proposals.
- The community rather than the forest owner or the buyer of stumpage should pay for social forestry benefits when these have involved extra expenditure.
- The wood user should not get his wood cheaper because of indirect or other benefits which have arisen entirely incidental to the business of wood production.
- Where possible the individual or group user rather than the community at large should pay for benefits which are specific rather than general and which can be quantified.
- Major revisions of stumpages should be at 5-yearly intervals instead of every 2 or $2\frac{1}{2}$ years as at present. They should be based on criteria set out in the original sales agreement.
- In addition all sales should have an escalation clause to compensate for the changing value of money. This clause should consist of an annual automatic adjustment to that part of the stumpage which represents the cost of operating, maintaining, and administering the forest, the formula for adjustment being the Forest Service Operating Cost Index.
- The Minister of Forests should appoint an independent stumpage advisory committee under section 15 (1) (g) of the Forests Act to recommend to him when there is a failure to reach agreement on stumpage revaluations.

The agreement which the Stumpages Working Party has reached on these and other matters has been the cause of great satisfaction to industry and the Forest Service, and is confidently expected to remove one of the major causes of friction between the two. There will of course always be difficulties and disagreements in any complicated commercial dealings such as long-term timber sales; nevertheless both parties can now look forward to an era of far more harmonious co-operation than has ever been possible in the past.

FOREST SANCTUARIES

For many years it has been the intention of the Forest Service to set aside representative areas of all New Zealand major forest associations and to give them full legal protection so that they are preserved for all time as strict scientific reserves. The Forest Service is in a good position to do this. Through the earlier work of the National Forest Survey, the more recent ecological survey work of the Forest Research Institute, and the catchment-condition surveys of the Forest and Range Experiment Station it has a good knowledge of the composition of New Zealand's indigenous forests on land of all tenures; it has available to it an accepted and workable classification of forest types (the McKelvey-Nicholls classification), and in the forest sanctuary provisions of section 20 of the Forests Act it has adequate and effective legal powers.

Forest sanctuaries are proclaimed "to preserve in their natural state the indigenous flora and fauna therein and for scientific and other like

purposes". The basic rules in administering forest sanctuaries are that no plants or animals may be taken or destroyed, no leases or privileges over the land or the forest produce can be assigned, and public use should be restricted whenever entry would be likely to affect the scientific values for which the sanctuary was created. Once a sanctuary has been proclaimed the consent of Parliament is required to revoke it or exclude any area from it. In these respects sanctuary status accords rare flora and fauna greater protection than does any other type of reservation.

Unfortunately the procedure for gazetting forest sanctuaries is slow and cumbersome because boundaries must in law be precisely described by costly and time-consuming ground surveys. During the year discussions were held with the Surveyor-General to see if a simpler procedure can be devised to proclaim forest sanctuaries without in any way affecting their legal protection. Agreement has been reached, and it is hoped that far more rapid progress can be made in gazetting sanctuaries.

Though because of the difficulties referred to only eight sanctuaries have so far been gazetted, the Forest Research Institute and conservancies have been busy planning areas which should be given sanctuary status, and gazetting action has been approved for 10 of these: the Manaia kauris in Coromandel Forest Park; the interesting kauri-beech association in Katikati Forest; an example of the remnant kauri association of Great Barrier Island; the unique kaikawaka (*Libocedrus plumosa*) forest of Hihitahi; a remnant area of mixed rimu and black beech in the Wairarapa; an example of the rare species *Pittosporum dallii* in North-west Nelson Forest Park; a typical pakihi silver beech association in south Westland; an example of the floristically rich and ecologically interesting mixture of podocarp–hardwood forests of the western Bay of Plenty; and two areas of podocarp forest with high concentrations of the kokako or blue-wattle crow, one in Rotoehu Forest and the other on the Mamaku Plateau. The only area for which gazettal action was completed during the year was an example of mature totara forest at Whirinaki in central Bay of Plenty. This area replaced a larger totara stand in the same forest at Mangawiri previously chosen as a forest sanctuary, but much of which is in various stages of dying from an unknown cause.

A large number of other proposals are under consideration, covering a wide range of forest types throughout the country. Important among them are another kauri forest sanctuary, in Warawara Forest, Northland; representatives of podocarp, mixed podocarp–hardwood, and hardwood forests on the Mamaku Plateau in the Bay of Plenty and in the central North Island forests; selected areas of lowland beech forests in Nelson, Westland, and Southland; areas of particular interest in the Kaimanawa and Tararua forest parks and in the Kaweka and Ruahine ranges; and transects from low to high altitudes giving a succession of forest associations in the Catlins district, Southland, and in various other hill and mountain forests in both islands.

Simultaneously, as indicated in the 1970 report, the Forest Service is advising the Scenic and Allied Reserves Committee of the National Parks Authority on the need for strict scientific reservations in scenic reserves and is co-operating with the Department of Lands and Survey in the joint survey of scenic reserves designed for this and other purposes.

It is hoped that before long full legal protection will be given to representative and scientifically valuable type areas of all major forest associations, whether in State forests, national parks, or scenic reserves.

RESEARCH FACILITIES

The second stage of the new Forest Research Institute at Rotorua was completed early in 1972. Plans are being drawn for buildings on the Ilam campus of the University of Canterbury for the Protection Forestry Branch (now at Rangiora) and some units of the Production Forestry and Pathology and Entomology branches. Further buildings are needed at Rotorua to replace remaining makeshift accommodation and so provide up-to-date facilities for all research. It is therefore disappointing to record that delays in obtaining the support of the National Research Advisory Council will mean that stage three of the planned redevelopment will fall well behind schedule, to the detriment of New Zealand's forestry research effort.

HEAD OFFICE REORGANISATION

The meaning of forest conservation as understood and administered by the Forest Service was explained in the 1970 report. Within Head Office such work has traditionally been administered by the Forest Management Division. Having regard to the growing public concern about the quality of the environment and the need to accord even greater emphasis to environmental issues as major utilisation proposals develop, the organisation was strengthened during the year by the establishment of a separate Environmental Forestry Division under a Director of Environmental Forestry. This division, in close liaison with other divisions, will deal with the many matters involved in the Forest Service concept of environmental forestry, including conservation, recreation, mountain lands revegetation, noxious animals control, and the reservation of areas for protection, scenic, and scientific purposes. The division will also administer the growing number of forest parks.

Since 1961 sales of forest produce, other than log exports for which the Commercial Division has been responsible, have been administered by the Forest Economics Division. This division has had the two major responsibilities of marketing and planning. Both short- and long-term sales of forest produce have increased dramatically since 1961 and continue to increase. Greater volumes and complexities, plus the increasing tempo of marketing, have led to new and at times difficult types of marketing negotiations. To handle these more effectively a separate Marketing Division has been established under a Director of Marketing, who is responsible for marketing of forest produce, including log exports. The annual value of wood sold from State forests is now $17.7 million. The Commercial Division will continue to manufacture and market sawn timber. The Forest Economics Division, relieved of marketing responsibilities, will be able to concentrate on the major tasks of short- and long-term development planning, demand and supply prognostications, national and regional requirements, economic, accounting, and trade advisory investigations, and statistics of all forests and forest industries.

PRODUCTION FORESTRY

AFFORESTATION

Planting—The aggregate area of new planting in State forests during 1971 was 32,156 acres (13,014 ha). Regional targets, based on the 1969 national planning model targets, were modified by the need to find employment for special winter labour.

Details are as follows:

Planning Districts	Area Planted		Targets for 1971–72	
	acres	(*ha*)	*acres*	(*ha*)
Northland ..	2,180	(882)	1,400	(567)
Auckland ..	3,217	(1,302)	2,400	(971)
Rotorua ..	6,363	(2,575)	8,800	(3,561)
Gisborne ..	2,697	(1,091)	1,960	(793)
Hawke's Bay ..	3,618	(1,464)	4,800	(1,943)
Wellington and Taranaki	1,140	(461)	900	(364)
Wairarapa ..	564	(228)	500	(202)
North Island ..	19,779	(8,004)	20,760	(8,402)
Nelson and Marlborough	4,384	(1,774)	4,040	(1,635)
Westland ..	1,806	(731)	1,000	(405)
Canterbury ..	1,351	(547)	1,200	(486)
Otago	2,906	(1,176)	2,500	(1,012)
Southland ..	1,930	(781)	500	(202)
South Island	12,377	(5,009)	9,240	(3,739)
New Zealand	32,156	(13,013)	30,000	(12,141)

Species planted—More than 29,000 acres (11,700 ha) of new planting and 11,000 acres (4,450 ha) of restocking was of radiata pine, representing 90 percent and 92 percent respectively of the total area stocked during 1971. Notwithstanding the outstanding productivity of radiata pine some concern has been expressed at the progressively declining area planted with Douglas fir; 2,175 acres (880 ha) of new planting and 680 acres (275 ha) of restocking was established with this species, compared with 3,545 acres (1,435 ha) and 372 acres (151 ha) respectively in 1970–71. Douglas fir is slower growing than radiata pine, but the species enjoys an international reputation for the production of quality framing timber and it is expected that the demand in the Pacific basin will grow steadily. Other species planted include Corsican pine and eucalypts.

Restocking—In 1971, 12,226 acres (4,948 ha) was restocked by planting (as distinct from natural regeneration or aerial seeding), 4,600 acres (1,862 ha) being in the Rotorua planning district. This total

may be compared with areas of 8,899 acres (3,601 ha) for 1970–71 and 5,318 acres (2,152 ha) in 1969–70 and reflects an increased emphasis on restocking by planting and less dependence on the uncertain and slow techniques of natural regeneration.

Clear felling—The area of exotic production forest clear felled (11,237 acres—4,548 ha) was again a record, and was 353 acres (143 ha) more than in 1970–71. The largest regional cut was in Rotorua Conservancy, where 5,895 acres (2,386 ha) was felled. The total yield from clear fellings was 87,179,000 cu ft (2,469,000 m^3).

Thinning—Intermediate wood yields from thinnings of saw logs, pulp logs, and smallwood was 16.9 million cu ft (479,000 m^3), a reduction of 2 million cu ft (57,000 m^3) from last year. Thinnings may be made early in the life of a crop, with or without recovery of wood, to stimulate growth of the best trees. The area of exotic forest thinned was 26,885 acres (10,880 ha), of which 20,800 acres (8,418 ha) was thinned without recovery, as compared with 21,225 acres (8,590 ha) in 1970–71. The bulk of the thinning was applied to radiata pine stands.

Pruning—The purpose and value of pruning as a forest-management operation is discussed elsewhere. The total area pruned during the year was 35,342 acres (14,303 ha), nearly 10,000 acres (4,050 ha) higher than in 1970–71. All but 300 acres (121 ha) was radiata pine. Pruning to about 20 ft (6 m) is generally a three-stage operation spread over 2–4 years. The area given the final stage during the year was 10,343 acres (4,186 ha).

Acquisition of land—By and large the availability of land is not a major constraint to forest development, and offerings of land exceed the available finance for both purchase and subsequent planting. With the changing economic climate for sheep farming, land is now being offered of a type not hitherto available for afforestation, in a cleared state and more strategically placed in relation to potential markets than much of the land acquired in the past.

Substantial areas of Maori land are being offered for forestry by owners who are aware of the good start made on the earlier Maori lease areas and are now anxious to make their land productive. Unfortunately such offers cannot always be readily accepted within the Forest Service's current planting allocation and financial resources. Although many of these areas would be useful additions in regions zoned for major afforestation development, existing commitments may preclude an early start. Nevertheless an important addition was made with the leasing of 21,000 acres (8,500 ha) in one high-priority Hawke's Bay region. This area, which has been named Awahohonu Forest, will be planted at a rate of 1,000 acres (400 ha) a year.

By providing money for land purchases in the Poverty Bay - East Cape region the Government took another important step in giving effect to the Taylor report recommendation for reafforestation of critical headwaters. Several properties were acquired and a sizable new area was thus consolidated north of Ruatoria. This results from a purposeful change in land-acquisition policy to give greater flexibility to the Forest Service in planning and establishing the production-protection forests in this area.

Desirable acquisitions are not all for the production of wood. They include: land to enlarge forest parks or to provide access to them; land having limited wood-production potential but which should be afforested to safeguard downstream values; and eroding land which has no productive value but requires protection by revegetation and careful management. The last category is a logical addition to the large area of State protection forests in the high country of both islands. There is need with production-protection forests to implement the recommendation of the Forestry Development Conference for a separate planting target for the protective elements. Two new methods of acquiring indigenous forests are being considered: exchanging commercial timber from exotic forests for bush and long-term leasing.

Regional planning—For some time it has been apparent that co-ordinated planning of activities in State forests requires a regional approach. The individual forest must be managed in the context of broad aims for regional forest development and these in turn should be related to regional development plans in other ownerships or even other sectors. For these reasons the Forest Service has decided to draw up working plans by regions rather than by individual forests. Working plans, under the signature of the Minister of Forests, are the formal authorisation for all management activities in State forests.

Indicative planning for the forestry sector, with emphasis on wood production, has been carried out nationally and to a lesser degree regionally since the early 1960s. It is intended to strengthen such work at the regional level and to draw up the wood production aspects of working plans within this framework. In addition regional working plans will prescribe the various other uses to be made of State forests. These uses are assuming steadily increasing importance in the public mind and it is intended to make available to the public all working-plan information that is not confidential.

It will take some time to compile a country-wide set of regional plans, but work has begun in each conservancy following a conference of senior field officers during the year.

Expansion of forestry in Taupo basin—During the year more detailed investigations have been made into the possible expansion of forests south and west of Lake Taupo, a development which the New Zealand Electricity Department requires to protect its installations and which, because of its effect on the future of Turangi, the Ministry of Works would welcome. Much of the land is Maori owned and could be planted under a profit-sharing leasing scheme similar to that operating for Lake Taupo Forest, which is being established on the eastern side of the lake. An economic analysis has been made of the forestry potential of the part of the area that should be afforested to protect the Tongariro power project in the Lake Rotoaira catchment. If the catchment were planted at a rate of 2,000 acres (800 ha) a year the power project could be protected in little more than 10 years. This rate of planting linked with that in Lake Taupo Forest would provide employment for a steadily increasing work force. It is apparent that in this region afforestation has considerable productive, protective, and social values. The possibility

exists for land exchanges to provide desirable long-term boundaries for afforestation areas, for Tongariro National Park and Kaimanawa Forest Park, and for scenic reserves.

Extension forestry—New planting during the year under the forestry encouragement grants scheme and the forestry encouragement loans scheme totalled 9,522 acres (3,854 ha) compared with 4,980 acres (2,015 ha) the previous year. There are now over 600 approved projects under the grants scheme, their average area being 100 acres (40.5 ha). A feature of planting under the grants scheme is the increasing diversity in participation. Partnerships of professional men, investment groups, charitable organisations, women's groups, and companies, as well as farmers and farm companies, are now engaged in the establishment and development of woodlots and small forests from 5 acres (2 ha) to 4,000 acres (1,600 ha). Local authorities using the forestry encouragement loans scheme are beginning to develop sizable timber resources, the total area now fully approved or approved in principle for them being about 30,000 acres (12,100 ha).

The approved area under both schemes planted or to be planted over the next 8 years is approximately 100,000 acres (40,500 ha). Notwithstanding this very favourable development there are many landholders with extensive areas suitable for forestry who are prevented from effectively diversifying in this way through lack of finance for investment in afforestation. An effective solution to this problem would not only increase the national wood resource, but could improve economic and social conditions in the districts concerned.

SILVICULTURAL OPERATIONS

Financial restraints hamper intensive forest management—Tending operations over the life of a tree crop should be viewed in relation to each other as components of an integrated management process designed to produce the highest return from the forest and associated industry. An aspect of financial restraints of considerable concern to the Forest Service is the inadequacy of funds available to undertake planned silvicultural operations, which if neglected detract from the investment already made in the forest; and deficiencies in silviculture cannot be adequately rectified later. To grow quality wood economically and to retain and develop the skilled labour force necessary for the wide variety of forest tasks it is essential to have assured funds for tending as well as for land preparation and tree planting.

During the year substantial and difficult adjustments to silvicultural programmes were made in all conservancies because of inadequate funds. Large areas of highly productive young radiata pine stands have not been pruned or slasher thinned. At Kaingaroa Forest a proposed programme for 35,400 acres (14,300 ha) of tending had to be reduced by 8,500 acres (3,400 ha). Cuts were made principally in pruning, an operation designed to produce wood of the highest quality. Some economies were made by modifying operations to reduce unit costs.

Changes in the extent of tending programmes, first because of an inadequate allocation of funds and later in reinstating part of the original programme to provide work for unskilled special winter labour,

further complicated both short-term and long-term planning. Road construction, essential for land preparation and planting, is well behind in many districts, particularly those that have priority for large-scale planting, and it is essential that capital works programmes are in balance with forest development. A stop-go approach in funding increases the difficulty of developing a stable skilled labour force and causes field staff to doubt the practical value of long-term planning and programming and the stress on careful timing of tending operations.

Skilled labour force needed for small forests—A major limitation in developing both the quantity and the quality of farm woodlots and small forests is the shortage of skilled forestry workmen in most rural areas. Contractor gangs and consultant-manager organisations are becoming established in some districts, but the Forest Service and farmer organisations will have to promote and actively assist the development of these skilled units if the full potential of the small forest grower is to be realised.

Improved radiata pine being planted—In recent years increasing areas of radiata pine have been planted using tree stocks raised from seed selected to give an improved type of tree. Last year, for the first time, almost all the radiata pine planted in State forests was grown from one of two categories of selected seed:

- Select-quality seed, which is collected from not more than the best 10 forest trees per acre chosen on the basis of vigour, straightness of stem, fine branching, and virtual absence of stem cones.
- Seed-orchard seed, collected from specially established trees grown from grafted stock of very rigorously selected parent trees.

Trees grown from select-quality seed show a marked improvement in desirable characteristics over trees from unselected seed, but a far greater improvement comes from use of seed-orchard seed.

As a result of years of painstaking work by geneticists, seed orchards in Kaingaroa and Gwavas forests are now supplying a substantial amount of seed, and another at Amberley in Canterbury will contribute from 1973. Seed of orchard origin will be used increasingly, and by 1980 it is expected that all trees will be raised from this class of seed. There was keen interest by large companies and farm foresters in a small amount of orchard seed that the Forest Service was able to offer.

Stands raised from improved seed will be superior in every respect and will produce wood more economically both by reducing the cost of growing trees and by producing better trees.

Dothistroma pini disease—Unusually warm and moist weather over much of New Zealand during autumn and winter 1971 led to some resurgence of the *Dothistroma pini* needlecast disease of pines, especially in the North Island. Ground and aerial surveys conducted in July and August revealed widespread, but not unexpected, reinfection in some areas and also new infections in many recently planted crops. The Forest Service and owners of infected private forests co-operated in the aerial spraying of over 60,000 acres (24,300 ha) of radiata pine during November and December; 1,100 acres (450 ha) of Corsican pine in Kaingaroa Forest was also sprayed. Spraying with cuprous oxide (finely ground material suspended in water and applied at the rate of 2 lb of active copper per acre) remains an effective, economic control measure.

BETTER USE OF AVAILABLE WOOD

New Zealand has been blessed by an abundance of timber, first from the indigenous forests and then from the exotic forests planted 40 to 50 years ago. This situation is rapidly changing, necessitating intensive use of the wood grown. To encourage this State forest wood is being offered in large enough lots to warrant the capital investment necessary for processing material that has previously been wasted in forests and in sawmills. Major sales since 1969, including the sale from northern Canterbury State forests this year (see page 28), exemplify this policy of encouraging better use of wood. More complete use is now being made of the wood from indigenous production forests, including the sale of beech pulpwood for converting into chips for export and of tawa pulpwood for the manufacture of paper in New Zealand.

The need to conserve the country's remaining resources of indigenous timbers has frequently been emphasised in annual reports, in which the Forest Service has stressed both the difficulties of implementing a conservation policy and the serious consequences of unrestricted cutting. There was particular concern about dwindling North Island resources and, as a result of consultations between the Forest Service and the sawmilling industry, targets were set in 1966 with the object of reducing the total North Island cut to 144 million bd ft by 1970. The actual cut in that year was 114 million bd ft and it has since declined further, that for the year ended 31 March 1972 being 94 million bd ft.

LOGGING

Research—To supply the expanding markets of recent years the logging and log transport section of the forest industry has been able to introduce equipment and apply methods largely developed overseas to our forests with considerable success. However, the cost of logging and delivering the total national annual harvest of wood to utilisation plants is about $40 million, and the servicing of this effort by some form of research assistance is now essential. Even small savings in unit costs produce a substantial total gain, while more efficient logging improves the yield for the forest by reducing waste. More attention needs to be given to development and application of logging methods that reduce disturbance of the soil or catchments and waterways.

The first two steps toward formal research recommended by the Forestry Development Conference have been taken:

1. A senior Forest Service officer left in early March to study logging research organisations in North America and Europe. He will investigate their organisation, financing, control, and staffing.
2. The Forest Service has joined with industry, through the New Zealand Loggers' Association Incorporated, to engage forest consultants to examine and report on industry requirements in research and to suggest how to meet them.

Logging of dying totara—Public concern was voiced during the year over the logging of totara in Whirinaki State Forest in inland Bay of Plenty. Logging has been in progress there for over 30 years as part of

the Government policy of orderly release of indigenous timber to industry. However, about 6 years ago heavy totara stands in the northern part of the forest were found to be dying and some of the logging operations were diverted to concentrate on the salvage of dying and dead trees before they deteriorated and became worthless.

Typically in native forests trees that become mature and die are scattered through the forest. There is as yet no satisfactory explanation for the apparently recent and extensive mortality occurring in totara. Similar mortality has occurred from time to time in other indigenous species. The causes may well be complex and can be determined only by detailed ecological and pathological studies, which the Forest Service is pursuing. However, it should be appreciated that identification of the reason for the decline of stands will not necessarily lead to a remedy for it.

FIRE CONTROL

Fire hazard—For the third successive year there was dangerous fire weather from Palmerston North to the southern boundaries of Westland and Canterbury. The risk was mitigated by generally responsible public behaviour, but some outbreaks were caused by adolescents and children and publicity is being directed accordingly. The national fire danger rating index has now been complemented by a drought index to provide a more realistic assessment of fire probability. The Forest Service is indebted to the Meteorological Service for assistance with this project and the patience of its officers with the growing demands for long-range weather forecasts to ensure that prescribed burning is performed in safety. An excellent liaison exists with the forecasters, and it is hoped that an increase in the number of meteorologists will enable joint training of meteorological and fire control personnel on interrelated aspects of their work.

Developments—New Zealand - made "monsoon" buckets—water containers borne by a moving or hovering helicopter for deluging a fire—are now standard fire equipment. The appliance has proved highly successful with light fuels and on mopping-up operations.

The greatest advance for many years has been the installation of V.H.F. (very high frequency) radio at the fire-vulnerable Kaingaroa and Golden Downs forests. The new equipment has removed the exasperating uncertainty under the previous high frequency system, due to interference which was often crippling in a fire emergency.

Each conservancy has been supplied with small infrared fire detectors which are held in the hand to scan an area after a fire to find hotspots that could cause fire to break out again. The device is a promising means of determining when an area can safely be left.

High country fire problems—The retirement of class VII and VIII country from grazing in the South Island has led to a build-up in fire hazard that has been under the scrutiny of the various interested parties since 1969. It is now the consensus among county fire authorities, catchment authorities, the high-country branch of Federated Farmers, the Ministry of Works, the Department of Lands and Survey, and the Forest Service that the framework provided in the Forest and Rural Fires Act 1955 forms a satisfactory basis for control of this hazard.

The Forest Service is to advance further proposals for high-country fire prevention and control during the coming year. Already it has trained and organised a corps of volunteers in Canterbury, which while still in the formative stage has performed competently when required.

Land clearing—Approval was given to clear 50,000 acres (20,000 ha) by burning areas to be planted and replanted. Although the control of burns by State and private foresters generally gives little physical trouble and evokes little concern, there was an outcry against an isolated instance of smoke pollution in Rotorua during the year. Owing to the few suitable burning days in the Central North Island this year, it was necessary to complete a number of burns on private and State areas in unsatisfactory conditions. A stationary high-pressure weather system held the smoke over Rotorua for several days and closed the airport. Such a happening would be rare and it has never occurred before.

There is no economically or ecologically satisfactory alternative to burning when clearing land for planting. The stimulus given by the ash and the absence of competing vegetation greatly aid the growth of young trees and consequent reforesting of the cleared area. Broadly speaking the aim in controlled burning is to light up when the fuel is in the best possible burning condition and to use firing techniques giving a towering convection column that forms clouds and is carried harmlessly out to sea.

The types and quantities of particles and gases produced from burning forest fuels are largely the product of weather, fuel conditions, and firing technique. In optimum conditions burning scrub produces 7 lb of particulates per ton of fuel (3.18 kg per metric ton) whereas an automobile produces 130 lb per ton (59 kg per metric ton). In general no significant or lasting environmental degradation is associated with land clearing by fire and subsequent re-establishment of a vigorous forest.

PRODUCTION, CONSUMPTION, AND TRADE

TOTAL WOOD PRODUCTION

Total production from indigenous and exotic forests declined in the year ended 31 March 1972 to 281 million cu ft (7,957,900 m^3) from 289 million cu ft (8,184,500 m^3) in 1970–71, mainly because of a reduction in the volume of saw logs processed—140 million cu ft (3,964,800 m^3) compared with 150 million cu ft (4,248,000 m^3) the previous year. Other changes included marginal increases in logs produced for export and in the quantity of logs chipped. The volume of roundwood pulped was similar to that for last year, additional pulp production coming from the use of sawmill residues.

Indigenous forests contributed 33.5 million cu ft (948,730 m^3) of total wood production, slightly less than in the previous year. Until recently almost all the produce from indigenous forests has been saw logs but substantial volumes are now used for production of pulp (tawa) and chips for export (beech). The percentage of indigenous wood in total production dropped slightly to 11.9 percent.

The pulp industry used 48.9 million cu ft (1,384,870 m^3) of roundwood and 26.6 million cu ft (753,320 m^3) of sawmill residues, similar volumes to the previous year's. The use of waste paper declined to 3.5 million cu ft (99,120 m^3) roundwood equivalent; 7.8 million cu ft (220,900 m^3) of roundwood was processed into chips for export, a slightly larger volume than was used the previous year.

State forests contributed 43.6 percent of total wood production for the year, a marginal increase on the previous year's total. State indigenous forests contributed 55.4 percent of the total wood production from indigenous forests, 2.1 percent more than in 1971. State forests provided 41 percent of the total wood produced from exotic forests slightly less than in the previous year.

SAWN TIMBER PRODUCTION

Production of sawn timber for the year ended 31 March 1972 was 740 million bd ft, 5.6 percent lower than the previous year's record level of 784 million bd ft. The main reason for the drop in production was the generally reduced economic activity over the last 12 months, which has affected building especially. Production of timber fell mainly in major producing regions in which there was no large local demand. For example in Auckland Conservancy, in which local demand is high, total production rose slightly, whereas in Rotorua Conservancy, a major supplier of other North Island centres, production dropped by 8 percent.

Exotic production fell by 5.2 percent to 565 million bd ft, and indigenous sawn timber production continued to decline by a further 6.8 percent compared with last year to 175 million bd ft. The fall in indigenous production is due in part to the increasing competitiveness of exotic timber for joinery and particle board for flooring. The drop in indigenous production included a reduction of 9.5 million bd ft (6.9 percent) in the cut of rimu, and of 3.9 million bd ft (34.3 percent) in matai; the decline was more marked in the North Island than in the South Island.

A redeeming feature of the decline in exotic sawn timber production was a 16 percent increase in Douglas fir production compared with last year, reflecting better domestic and export markets for this species than in the previous year.

Domestic consumption of sawn timber for the year ended 31 March 1972 was 217 bd ft a head, 10 percent lower than last year's. However, exports continued to rise. For the calendar year 1971 they totalled 129 million bd ft, an increase of 16 million bd ft over the previous year's total. This increase was due mainly to a 15 million bd ft (19.5 percent) rise in exports of radiata pine. There was little change in other species. It was encouraging for New Zealand to achieve increases in exports when Australia and Japan, its main markets, were experiencing recessions.

The present levels of sawn timber production and consumption are regarded as temporary. The general improvement in economic conditions expected over the next 12 months is likely to increase building activity. This development, together with the recently announced increase in State Advances Corporation loan limits and the provision of additional housing finance by savings banks, should stimulate domestic consumption and production of sawn timber.

FOREST SERVICE WOOD PRODUCTION AND SALES

Production—Removals of roundwood from State indigenous and exotic forests totalled 122.6 million cu ft (3,472,000 m^3) during the year ended March 1972. This was 2.6 million cu ft less than for the previous year. The lower production reflected the lack of buoyancy in the New Zealand timber market particularly and the economy in general during the year.

Indigenous roundwood removals fell this year by 0.5 million cu ft to 18.5 million cu ft (523,900 m^3). The most marked decline was in Rotorua Conservancy where production at 1.3 million cu ft (36,800 m^3) was down by almost 22 percent. There were smaller falls in Auckland and Southland conservancies. Lower production in the conservancies mentioned was partly offset by increases in removals in Wellington, Nelson, and Westland conservancies. Westland remains the largest single producer, with 6.2 million cu ft (175,600 m^3), an increase of 0.4 million cu ft (11,300 m^3) over the total for the previous year.

The overall fall-off in indigenous removals is largely attributable to the increasing competition of wood from exotic forests.

Removals from exotic forests also fell this year by 2.1 million cu ft (59,500 m^3) to 104.1 million cu ft (2,948,100 m^3). Export logs accounted for 21.7 million cu ft (614,500 m^3) or 21 percent of the total. The decline was greatest in Rotorua Conservancy, where exotic roundwood production fell by 4.6 million cu ft (130,300 m^3) or 6.8 percent. Smaller reductions were recorded in Wellington and Southland conservancies. There was, however, an increase in production of 2.7 million cu ft (76,500 m^3) of exotic roundwood in Nelson Conservancy, and smaller increases in Auckland and Canterbury conservancies. Rotorua Conservancy remains the largest producing region, with removals totalling 67.3 million cu ft (1,905,900 m^3). Of this total 64.4 million cu ft (1,823,800 m^3) or 95 percent came from Kaingaroa Forest, which alone produces 65 percent of all the wood harvested from State exotic forests.

Sales—The value of wood sold and removed from State forests during the year ended March 1972 totalled $13.7 million, compared with $13.1 million in the previous year.

Sales of standing timber from indigenous forests amounted to 14.9 million cu ft (422,000 m^3), valued at $1.2 million. Volume and value were both slightly less than in the previous year. The total for exotic forests was 51.7 million cu ft (1,464,100 m^3), with a total value of $2.4 million. The average stumpage was 8.0c per cu ft ($2.83 per m^3) for indigenous species and 4.6c per cu ft ($1.62 per m^3) for exotic species. The figures for the previous year were 8.5c per cu ft ($3 per m^3) and 4.6 per cu ft ($1.62 per m^3) respectively.

Sales of logs totalled 56 million cu ft (1,585,900 m^3) valued at $10.2 million. Indigenous forests contributed 3.6 million cu ft (102,000 m^3) and $1.1 million to these totals, while exotic forests contributed 52.4 million cu ft (1,484,000 m^3) and $9 million.

Major Canterbury sale—Proposals were invited for utilisation over 10 years of 64 million cu ft (1,812,500 m^3) of wood from three north Canterbury State forests. About half the wood is of saw log and peeler quality for domestic use, the rest is pulpwood. The aim in calling for proposals was to achieve fuller use of the wood available as well as some rationalisation of the sawmilling industry in Canterbury.

Negotiations are proceeding on the proposals. These cannot be finalised yet, but there will be an interim agreement to ensure log supplies to the main sawmills in Canterbury. The successful proposer and the other major sawmillers involved have agreed on volumes, price, and log supplies. Arrangements are being made for the logs to be debarked at a central site to ensure that the sawmill residues can be converted, along with pulpwood, into chips for sale.

Provided a satisfactory chip sale can be negotiated by the proposer, the method of marketing the wood will show in a practical way how the policies of full use of wood available and rationalisation of industry can be achieved.

In addition to the 64 million cu ft of the 10-year sale, 800,000 cu ft (22,650 m^3) of State forest wood will be offered for sale by competitive tender during each of the next 10 years. These annual sales should ensure that the more efficient sawmillers have adequate wood. In Canterbury about half of the wood sawn is from private forests, and sawmillers not supplied from the State sales will compete for supplies from this private resource.

PULP AND PAPER

Pulp production for the year ended 31 March 1972 reached a record 571,000 tons (580,000 metric tons), 4,000 tons more than in the previous year. The higher output was due almost entirely to increased production of mechanical pulp, chemical pulp production remaining at virtually last year's level. There will be large increases in production of mechanical and chemical pulp over the next 12 months from major extensions to pulp mills.

Paper and paperboard production for the year ended 31 March 1972 totalled 461,000 tons (468,000 metric tons), about 6,000 tons more than in 1971, of which 4,000 tons was newsprint and 2,000 tons other paper and paperboard.

Domestic consumption of paper fell slightly.

PANEL PRODUCTS

During the year ended 31 March 1972 the following production estimates were supplied to the Forest Service:

	Particle Board ($\frac{3}{4}$ in. basis) *million sq ft*	Plywood ($\frac{3}{8}$ in. basis) *million sq ft*	Fibreboard *tons*
Total	31.1	65.9	44,807
Increase over previous year ..	1.5	7.8	1,154

	metric tons	*thousand cubic metres*	*metric tons*
Total	36,289	29.2	45,524
Increase over previous year ..	1,471	3.5	1,203

Present indications still point to a continuing expansion in the manufacture of panel products.

COMMERCIAL DIVISION OPERATIONS

Waipa sawmill—Sawn timber production for 1971 was 44.2 million bd ft—slightly lower than in 1970. The operating profit for the year was $359,827 which, after providing for interest and taxation, represented a return of 8.3 percent on shareholders' funds under the existing notional capitalisation authorised by Treasury. This is an improvement on the previous year, when the operating profit was $315,088 and the tax-paid return 7.8 percent.

Conical Hill sawmill—Production of sawn timber during 1971 was 11.2 million bd ft. Operating profit fell from $85,050 in 1970 to $55,300 in 1971, which on the same basis as Waipa gave a return of 4.1 percent on notional shareholders' funds.

Sawmill economics—Sharp increases in wage and other operating costs in sawmilling have not been matched by compensating increases in timber prices. Since 1936, except for a relatively brief period from 1965 to 1970, sawn timber has been continuously subject to some form of price control. During this time a formula evolved that permitted sawmillers to cover higher wage costs in timber prices. Timber price movements for a number of years have not had regard to costs and other economic factors affecting the sawmilling sector of the timber industry. The New Zealand Sawmillers' Federation is undertaking a financial survey to determine what selling price increase is necessary to restore reasonable profitability to the sawmilling sector so that the federation can negotiate with the Department of Industries and Commerce on sawn timber prices. Nor have rising internal costs been recoverable in export prices. Unprecedented increases in sea freights and associated costs, combined with unfavourable currency realignments, have reduced New Zealand's competitive position in international sawn timber trading.

The increased profitability for Waipa in 1971 stems from improved efficiency and the fact that cost escalation hit hardest toward the close of the year. This handicap can be expected to persist seriously during 1972 in the absence of any basis yet for recovering much of the higher costs being incurred.

Stumpages—The stumpage paid by Waipa in 1971 remained at 5c per cu ft ($1.77 per m^3). The price for logs delivered to Conical Hill was equivalent to a stumpage of 3.5c per cu ft ($1.24 per m^3). Various restraints on their commercial business operations while administered within a Government department mitigate against the two mills' profit-earning and stumpage-paying capacity. These restraints are already making themselves felt and must increasingly affect either stumpages or profitability.

Plant modernisation—Plans for Waipa and Conical Hill provide for extended factory facilities, including finger jointing, glued lamination, and precutting to convert sawn timber to higher-quality finished products in order to widen marketing opportunities. In this way the mills will simply follow the industry trends towards ever-widening diversification. Projects begun or undertaken during 1971 were:

Waipa—The installation of a second chipper and screens to recover chips from additional slabwood and dockings in the sawmill; the replacement of the log carriage and tracks for the band headrig unit; the provision of separate table and handling facilities for junk timber, particularly flitches for the Japanese market; and the replacement of the band mill log pond with a live deck.

Conical Hill—The provision of new planing and remanufacturing facilities to include finger jointing, edge bonding, glue lamination, and precutting; the starting up of new multi-salt pressure treatment plant; and the erection of a new fire station.

Marketing—Douglas fir sales to Australia have not been maintained at earlier levels, owing mainly to substantially higher freight rates. Freights to the Pacific Islands have also risen markedly, but sales levels there have been reasonably maintained. Exports to Japan have continued at unchanged levels and contracts have been negotiated for a further 2 years. Waipa mill contributed substantially to the shipments of sawn timber to the United Kingdom during the year.

A major adverse trend affecting Commercial Division has been the intense competition in Otago-Southland, where suppliers of exotic and indigenous timbers are competing for a limited and already oversupplied market. Conical Hill is experiencing difficulties in securing balanced outlets for its full range of production and has made every effort to maximise sales to overseas markets. Preparations are well advanced for marketing fence posts produced by the new treatment plant referred to above.

EXTERNAL TRADE

Exports—Exports of forest products in the calendar year 1971 reached a record value of $78.6 million, which surpassed the previous record, set last year, by $7.6 million. Most of this increase is attributable to the growth in exports of wood pulp, logs, and sawn timber. The only major item which did not rise in value was paper, but returns were close to the 1970 figure. Australia and Japan continue to be New Zealand's principal markets for forest products, Australia buying 43 percent of all forest exports by value, and Japan 42 percent. The Pacific Islands remain the next largest export market.

Log exports—The volume of log exports was the same as in 1970, at 64.3 million cu ft (1,821,000 m^3), though the f.o.b. value increased by $3.7 million to $28.5 million. Japan again dominated the log export trade, taking 97 percent of the logs; Korea was the only other market of any consequence.

Wood chip exports—The export trade in wood chips continued to expand in 1971; revenue exceeded $1.8 million.

Sawn timber exports—Sawn timber exports rose by 15.7 million bd ft in 1971 to almost 129 million bd ft. Their value increased by $1.6 million to a record $12.3 million; radiata pine ($8.1 million) and Douglas fir ($3.1 million) accounted for over 90 percent of this total.

During the year 36.8 million bd ft of radiata pine was exported to Australia and 35.1 million bd ft to Japan, both substantially higher volumes than in the previous year. Shipments of radiata pine totalling 14 million bd ft were also made to the United Kingdom in 1971, the bulk of it in two large consignments.

Douglas fir exports to Australia recovered slightly to 17.6 million bd ft compared with the low 1970 volume of 16.6 million bd ft. This rise more than offset a slight drop in Douglas fir exports to the Pacific Islands.

Paper and pulp exports—Paper exports at 142,700 tons (145,000 metric tons) were almost the same as in the previous year and earned slightly more than in 1970. Pulp exports increased by 2,000 tons to 98,000 tons (99,600 metric tons), returns totalling $9.7 million, which was 7 percent more than in 1970. Australia, which took 81,000 tons (82,300 metric tons) or 82 percent of total exports, continues to be the main export market for pulp. Most of the rest went to South-east Asia, the Philippines being the second largest market after Australia.

Other products—Exports of panel products continued to grow in 1971, rising to a total of 35.7 million sq ft (3,306,500 m^2) valued at $6.4 million. Fibreboard is still the major item, but exports of particle board and plywood are expected to increase.

Imports—In 1971 the value of imports of forest products fell by $4.4 million compared with 1970 to $18.3 million c.d.v. (current domestic value in their country of origin), owing mainly to a 31 percent reduction in the amount of sawn timber imported—14.5 million bd ft compared with 20.9 million bd ft in 1970. Imports of hardwoods and softwoods were both lower, the decline being more marked with softwoods.

Though the volume of paper and paperboard imported fell by 29 percent, compared with 1970, to 19,900 tons (20,200 metric tons) the total value (c.d.v.) declined by only 11 percent because of higher unit prices. Pulp imports in 1971 totalled 14,400 tons (14,600 metric tons), a fall of over 4,000 tons on the previous year; their value was $1.1 million (c.d.v.).

Australia, the United Kingdom, and the United States are the major suppliers of the forest products imports. Australia, which supplied 25 percent by value (c.d.v.) of total requirements in 1971, has now supplanted the United Kingdom as the main supplier.

New Zealand - Australia Free Trade Agreement—Trade in forest products remains the core of the agreement from the New Zealand viewpoint. Reciprocal trade in forest products continued to increase

during the year, exports from New Zealand rising by $2.1 million to $33.4 million and Australian exports to New Zealand increasing by $0.6 million to $4.3 million.

Unfavourable effect of exchange rate changes—Recent realignment of international exchange rates has generally been unfavourable to New Zealand's export trade. Our exchange rate with Australia has remained unchanged while the United States and Canada have devalued, which means that New Zealand faces competition from Canadian and United States wood products exports, especially of sawn timber. New Zealand is similarly affected on the Japanese market, where the prices set by Canada and the United States as major suppliers will influence those that New Zealand, a minor supplier, can negotiate.

RESEARCH AND DEVELOPMENT

RESEARCH PROGRAMMES

The *Report of Forest Research Institute for 1971,* published separately, deals fully with that year's research programme.

Forest Service research programmes are drawn up for 3-year periods, and all conservancies and divisions of the Forest Service are consulted on research needs. The present programme covers 1971–73. Draft programmes are considered by research advisory committees, which include industry representatives, and finally are submitted to the Director-General of Forests for approval. Meetings of the research advisory committees maintain liaison between research workers and the forestry and forest products industries over the period of the programme.

Symposia conducted each year by the Forest Research Institute provide a further link with forestry practice. At these meetings people in the Forest Service, other organisations, and industry are invited to discuss fully specific subjects, which enables forestry scientists to disseminate their results widely and to obtain simultaneously a clear picture of what research should be done in that field. Since 1961 there have been 13 symposia covering: use of fertilisers, chemical methods of vegetation control, land preparation, inventory methods, nursery and forest-establishment practices, pruning and thinning practices (two symposia), beech forestry, genetic improvement of radiata pine, the role of pine species other than radiata pine, mountain lands forestry, the role of exotic trees other than pines in New Zealand forestry, and mechanisation of silvicultural operations.

The symposia have created world-wide interest, the 1970 symposium on pruning and thinnng particularly making an impact on the thinking of both New Zealand and overseas foresters.

Research results are widely disseminated through reports and publications, including the *New Zealand Journal of Forestry Science,* which the Forest Research Institute began in 1971. Liaison between research workers and the forest products industry is facilitated by the day-to-day contacts of Utilisation Development Division officers stationed at Head Office and conservancy headquarters.

The Forest Research Institute is very conscious of the need to relate a large part of research to practical requirements, and this is shown by the following list—which is by no means exhaustive—of the benefits from some of its investigations:

- Development of spray programmes for the control of *Dothistroma* needle-cast disease on pines and terminal crook disease in nurseries.
- Control of *Sirex* wood wasps by parasites.
- Management guidance arising from profitability studies.
- Tree improvement by selection and breeding.
- Improvement of forest yields by prescription of fertiliser treatments to counter nutrient deficiencies.
- Improvement of timber seasoning and preservation.
- Testing of wood for engineering properties.

- Testing of New Zealand tree species to determine their suitability for pulp and paper making.
- Development of techniques for revegetation of eroded high country and for assessing the effect of noxious animals on the vegetation of high-country catchments.

METRICATION

Forest operations—A Forest Service metrication committee was established in 1970 to examine the implications of metrication on Forest Service activities. Metrication of sizes for sawn timber and wood-based products was excluded from the committee's terms of reference.

It soon became evident that the Forest Service should not remain independent of other forest growers, and on the initiative of the Forest Service a Forestry Metrication Committee has been formed under the aegis of the Metric Advisory Board. This committee, which includes representatives of the Forest Service, the Forest Owners' Association, and the Institute of Foresters, held its first meeting on 17 March 1972.

A draft timetable for conversion to metric measure has been prepared together with proposed measurement conventions, and it is hoped to have full acceptance of these by about mid 1972. Metric conversion applying to all forestry activities except the selling of wood is programmed for introduction in January 1974. With regard to sale of wood the changeover will not come into effect until January 1975 so as to coincide with the introduction of metric measurement in the timber and building industries.

Timber sizes—Metrication of sawn timber sizes is now under consideration by a Standards Association committee comprising representatives of producer and user organisations, the Building Research Association of New Zealand, and the Forest Service. A draft specification has been agreed on and is expected to be circulated for public comment about mid 1972 and finalised later in 1972.

WOOD USE

Beech saw log and pulpwood investigations—A saw log specification for beech logs has recently been derived with the objective of defining in simple terms the lower limit of saw log quality that would be acceptable to the current market. The specification applies to all beech species and covers all commonly encountered defects. The feasibility of applying the specification in the field is currently being tested, and the efficiency of the specification in sorting merchantable saw log material from pulpwood is currently under examination.

Beech pulpwood investigations were undertaken to determine the variation in basic density of the several beech species both within and between designated regions in Westland, Nelson, and Southland conservancies. The object was to relate green pulpwood volume to bone dry units of chips.

Machine stress grading—A project to investigate the economics and feasibility of introducing commercial machine stress grading at Waipa sawmill has now been completed. Visual and machine-stress-grade

recoveries were determined for radiata and Corsican pines and for Douglas fir in a range of widths for timber of 2 in. thickness. It was found that it is possible to use a stress-grading machine for the production of a machine-stress-graded equivalent to visual No. 1 Framing grade for use in traditional (non-design) light frame construction, as well as for the production of stress grades with assigned stiffness and strength values in bending for use in design construction. Machine stress grades can be produced equivalent to present visual structural and lamination grades.

In all cases grade recoveries are significantly higher with machine grading than with visual grading and this is the main virtue of machine grading as a production technique as far as the producer is concerned. The economics of installing a high-speed stress-grading machine at Waipa sawmill, linked to the output of a planing machine, were found to be favourable. The preparation of a machine-stress-grading standard is regarded as necessary to pave the way for market acceptance of machine-stress-graded timber. Such a standard would need to provide for effective policing of the marking system. Also steps need to be taken to make provision for the acceptance of machine-graded timber in other relevant standards including the Model Building Bylaw.

Acceptance of this system of grading timber by producers and users is expected to be cautious and therefore slow. Adoption of the system by producers will depend mainly on whether likely markets for stress-graded timber justify the cost of the machine. This emphasises the need for vigorous promotion of the use of stress-graded timber for designed structures, irrespective of whether such timber is graded by machine or visually.

Timber quality of Douglas fir—A research programme to determine the quality of Kaingaroa Douglas fir timber likely to be produced in the next 3-year period (1972–74) was carried out as a co-operative project involving Utilisation Development Division and the Forest Products Branch of the Forest Research Institute. The programme was drawn up in consultation with the New Zealand Sawmillers' Federation.

The project investigated, in stands representative of those to be logged in the next 3-year period:

(a) Intrinsic (clear wood) wood properties;
(b) Visual grade recovery;
(c) Machine-stress-grade recovery.

The effects of various tree and log characteristics on both intrinsic wood quality and grade recovery were also investigated. This programme was an extension of earlier studies carried out on Douglas fir timber quality in Kaingaroa, Golden Downs, and Hanmer forests. The study has provided data which can be used as a basis for decision making on action necessary to ensure that quality requirements for Douglas fir timber for the domestic and export markets are met. The significance of the results obtained and implications for the Forest Service and the sawmilling industry are being evaluated.

Specification for timber and wood products—At a seminar convened by the Forest Service in December 1969 and widely supported by timber producers, specifiers, and users it was unanimously agreed that all specification writers in New Zealand would benefit from authoritative directions and guidelines on the wording of specifications covering the

use of timber and wood products in building. Considerable progress has since been made and the agreed-on directions are likely to be published as a Standards Association document covering the specification of timber and wood-based products in building as regards both materials and workmanship. It will probably contain certain specific requirements and also clearly distinguished guidance notes. It is expected that the format of the standard will be followed by specifiers in individual job specifications. The timber specification standard will probably relate to the Model Building Bylaw N.Z.S.S. 1900 in so far as compliance with the specific requirements of the timber specification standard would constitute compliance with the Model Building Bylaw.

Research into light timber frame construction—During the year a committee of representatives from the Forest Service, Building Research Association, Timber Research and Development Association, Auckland Technical Institute, and Engineering School, Auckland University, considered possible lines of research into light timber frame construction. The committee, which will co-opt other individuals or organisations whenever desirable, will endeavour to co-ordinate research and development in timber frame building in New Zealand and watch research developments to ensure their relevance to the current situation, review progress achieved, and co-ordinate publication of results.

The spur to the initial meeting was the fact that when metrication is introduced wall studs will need to be at 600 mm (24 in.) or 400 mm (16 in.) centres, instead of the present 18 in. spacing, to fit in with the new metric width of sheet (panel) materials of 1,200 mm (48 in.).

The first stage of the wall frame testing programme is being carried out at Auckland University on panels constructed with standard grades of timber, and appropriate stud spacing. The extension of this programme will have regard to the rational use of timber in building and the Forest Research Institute research programme towards this objective.

Timber inspection and quarantine—The most significant development affecting timber quarantine has been the introduction and rapid growth of container shipping services between the east coast of North America, Australia, and New Zealand, with two further services linking New Zealand with the Pacific Coast ports and a regular container service to the United Kingdom coming into operation later this year. Present indications are that within a year there will be 100 container ship movements a year at both Auckland and Wellington and 1 call each month at Port Chalmers.

The change from general cargo handling methods to containerisation poses greater risks of accidental insect entry in wood packing and dunnage unless special precautions are taken. Port inspection is therefore being reorganised to provide inspection and clearance of overseas containers before they leave the port terminals for road or rail transport to inland centres.

The adoption of uniform standards for timber quarantine requirements for Australia and New Zealand has greatly assisted the introduction and operation of a workable system of container manifest code marking, indicating the type of packing materials used, and this helps port inspectors to assess the degree of risk involved with any container. It also assists overseas exporters, who have the one standard to meet for shipments to Australia and New Zealand.

At first much infested dunnage, wood packing, and pallet material was found in containers, and many required fumigation at the port of entry, but sterilised dunnage and pallets are being used increasingly by exporters and shipping companies, greatly reducing the risk of entry of harmful insects. Containers are examined initially at the terminal, and released subject to full inspection at destination.

The adoption of a two-shift system of container handling on the waterfront has extended the hours that the port inspection service has to operate. This has created serious staffing problems, which can only be met by appointing more officers.

EQUIPMENT

Improved communications—The v.h.f. radio systems that have greatly improved communications for fire control at Kaingaroa and Golden Downs forests (see page 24) have also improved communications for forest management. The Kaingaroa system is connected with automatic telephones at the headquarters so that a person anywhere in the forest can talk to appropriate officers at their desks. A v.h.f. system is to be installed at Lake Taupo Forest in the coming year and progressively in other exotic forests.

Kaingaroa township has been cut over to an automatic telephone service included in the Rotorua free-calling area. The township, which is the administrative centre for the forest with a resident population of 1,200 people, previously had a manual system which long since had ceased to meet the needs of an undertaking of the size and importance of this forest.

Mapping control—A method of using inexpensive "mini" ground marks has been developed to reduce the time and cost for ground marking to control the mapping of forest stands from aerial photographs. To obtain accurate measurements and areas from aerial photography it is necessary to relate identified positions on them to corresponding surveyed positions on the ground. Normally this is done by placing 20 ft × 30 ft (6 m × 9 m) white calico crosses, held down by wire netting, over surveyed points. The ground marks, which must be large to show up on the aerial photographs taken from about 11,000 ft (3,000 m), are expensive to maintain.

The new method consists of using much smaller marks made of four 4 ft × 1 ft (122 cm × 30 cm) unpainted boards. These are photographed from a light aircraft flying much lower than is necessary for mapping. The position of the mini ground mark is then transferred to the mapping photograph by merging the two stereoscopically. Mini-mark photographs can be taken at short notice at almost any time and once obtained can be used for controlling subsequent photography of the same area.

Photogrammetric plotting—During the year a second-order plotter on long-term loan from the Department of Lands and Survey was installed in Rotorua Conservancy. Its use has overcome previously insoluble problems in mapping extensive areas of regenerated exotic forests in the conservancy and is a major step in updating forest map records.

Aerial colour photography—Forest Service map records are now compiled almost exclusively from aerial photographs, but as normal black and white photographs are not always suitable for interpretation the value of colour and infrared photography in forestry is being assessed. Experiments undertaken jointly with the Department of Lands and Survey and private industry over the last 6 years clearly indicate that much more information can be obtained from colour photographs than from identical black and white photographs. The additional information justifies the much higher costs for colour photography, but wider use is expected to reduce these, particularly in processing. Experiments with infrared film have so far been not very encouraging and it is doubtful if this medium will have any practical application for exotic forest interpretation. It could be of use in high-country research and for detecting disease in indigenous forests.

Farm bridges—Because of frequent inquiries about the use of treated poles for farm bridges, the Engineering Division has prepared a range of designs covering spans from 10 ft to 50 ft (3 m to 15 m). These bridges have been designed for light loading of up to 5,000 lb (2,300 kg) and construction has been kept as simple as possible.

ENVIRONMENTAL FORESTRY

REVEGETATION

The Forest Service is the principal Government agency for counter-erosion revegetation on all State-owned high country.

Planting continued on critical headwaters areas in the Poverty Bay - East Cape region for which reforestation has been recommended. A further 9,000 acres (3,600 ha) of this land has been acquired by the Forest Service, bringing the total under its control to 34.000 acres (13,800 ha), of which 16,500 acres (6,700 ha) has been planted.

Approximately 450 acres (180 ha) of the Kaweka Range was aerially seeded and about 100,000 willows and poplars and 24,000 young pines were planted in the Ruahine Range. As an experiment an area of eroding grassland in the Tararua Range was aerially topdressed and oversown with a mixture of grasses and clover. In Marlborough 3,000 acres (1,200 ha) was aerially seeded, mainly in the Branch and Leatham catchments, where rehabilitation work is giving encouraging results. Catchment boards are pressing the Forest Service to extend work into other depleted areas of the Wairau River and Motueka River catchments. Some 82 acres (33 ha) on Mt. Fyffe, near Kaikoura, have now been sown in grasses and legumes for erosion control in the upper Kowhai River catchments. In the second year of protective plantings on Mt. Thomas, near Ashley Forest, a further 150 acres (61 ha) was established, nearly completing work on the largest eroding area. Trials were continued in Southland to gauge the suitability of certain exotic trees and also of topdressing with fertiliser and oversowing of grasses and legumes as the means of revegetating very harsh sites on the Takitimu and Eyre Mountains. Encouraging results from seeding and fertiliser, alone or in combination, are giving confidence that aerial application will be the major tool for high-country revegetation.

GROWING RECREATIONAL USE OF STATE FORESTS

Though New Zealand has not yet experienced the intense demand for recreational outlets that arises in densely populated countries, use of State forests for recreation is increasing. The existing staff cannot cope adequately with the servicing now required and need to be augmented to overhaul arrears of work and keep pace with the public's expectations in regard to facilities, information, and guidance. To date a total of nine rangers and three patrolmen have been appointed to five of the nine forest parks to administer part of the 1.8 million acres (728,500 ha) now set aside.

A disquieting aspect of greater public use of State forests is the upsurge in vandalism. To assist in its prevention the Forest Service is encouraging greater activity by honorary rangers, who also assist in advising and guiding the public. Honorary rangers are to be supplied with distinctive badges and a comprehensive handbook and will be invited to participate regularly in field days and courses. The Forest Service greatly appreciates the voluntary help of these experienced people.

Good progress is being made with the planned long-term provision of recreation facilities in State forests generally. Over the years, to meet various needs, the Forest Service has undertaken substantial developments; these are now being used more and more by the public, especially those seeking their recreation in the solitude of our mountains and forests. A New Zealand-wide survey indicates that the following are regularly used in the pursuit of recreation: 644 huts, 36 shelters, 26 vehicle bridges, 142 foot bridges, 22 cableways, 29 vehicle fords, 1,800 miles (2,900 km) of car road, 800 miles (1,300 km) of four-wheel-drive track, 2,300 miles (3,700 km) of cut track, 230 miles (370 km) of bench track, 170 miles (270 km) of pony trails, 96 picnic sites, 10 swimming areas, 3 lookouts, and 21 airstrips. In addition, private clubs or other organisations have provided some substantial buildings and roads and even developed ski fields.

Accurate statistics on users of forest parks are essential for reliable long-term planning but are difficult to obtain because access is unrestricted, except for those with dogs or guns. Vehicle counters, used at main entrance points, permit only a rough estimate of passenger numbers. An infrared device for counting people has proved valuable in gathering statistics about public use of tracks or paths.

Use of State forests and forest parks by hunters is growing steadily and their numbers are known fairly accurately through the issue of permits. In the past 5 years permits issued have risen from almost 26,000 to 42,000 annually. Sportsmen hunters reported killing over 36,000 noxious animals during the year. By comparison, the number of deer reported killed by commercial hunters using helicopters, mainly in Westland, is just over 18,000. There are many unreported kills.

Forest parks and recreation areas—During the year Pirongia State Forest Park was gazetted. This brings the land gazetted as forest park to 1.8 million acres (728,500 ha). A further 185,000 acres (74,900 ha), involving the Kaweka and Rimutaka State forests, has also been approved for forest park status and is scheduled for early gazettal.

The Forest Service is ensuring that the active users of forest parks can, through park advisory committees, convey their views on Forest Service recreational policies to the Minister of Forests. It has been noted that some organisations are reluctant to consider the nomination of young people or women to the committees. Another problem arises through a great many organisations only indirectly connected with recreational use in forest parks seeking representation on the advisory committees to further sectional interests. Members are appointed by the Minister for the personal contribution they can make in advising him on recreational aspects of the administration of the forest park.

Over the main holiday period all available camp sites in Coromandel Forest Park were in use, and the decision to extend road access beyond the end of the county road was justified. User surveys indicated that the greatest demand was for short walks and similar outdoor activity close to the road end. On the other hand, the public appears to be against overdevelopment, as is the advisory committee.

A permit to use forest roads was granted to a company running tourist trips to South Head, Kaipara Harbour, and down Muriwai Beach. Forest roads in Woodhill, Mangawai, and Tairua forests leading to points of

particular interest have been open to the public, most of whom have acted responsibly. Permits have been granted for a wide range of recreational use of forests in Auckland Conservancy by individuals and organised groups. High on the list is hunting, particularly of fallow deer in Woodhill Forest, but groups as diverse as bird watchers and trail bike enthusiasts have been accommodated.

An estimated 47,000 people visited Whaka Forest in Rotorua Conservancy during the year, indicating the growing interest in recreation in forests and recognition of the opportunities in exotic forests. Development of amenity planting, picnic sites, and other facilities continues, and an amenity-recreation plan has been prepared for Kaingaroa Forest.

Great interest is now being taken in recreation in forest and mountain lands close to Wellington City. A Forest Service office has been opened at Upper Hutt in order to assist the many people using the southern part of Tararua Forest Park and the Rimutaka Forest Park. The Forest Service has assisted in training and equipping local volunteer fire fighting groups, mainly recruited from local conservation societies, interested in preventing and controlling fires that occur in the gorse-covered slopes surrounding greater Wellington. The goal is to eliminate fires on the hills to enable native forest to regenerate or, where appropriate, exotic forest to be planted. Good fire control will enhance the superb distant scenery of the Wellington hills and greatly improve recreational areas close to the city.

The advisory committee for North-west Nelson Forest Park has been appointed in terms of the new regulations. Recreational use of the park continues to expand, and the facilities on the popular routes, particularly the Heaphy Track, are taxed during peak periods. There is concern at the possibility of the forest park's wilderness value being endangered by the formation of public roads.

Recreational opportunities opened up in forests in Canterbury Conservancy are rapidly grasped by the public. Use of forest walks and the drive at Hanmer Forest continues to increase; a new picnic area at Balmoral Forest was used to capacity over the holidays and will have to be extended; there is heavy demand for a Forest Service sponsored hunting scheme in north Canterbury; and ski fields at Craigieburn Forest Park grow in popularity.

Progress has been made in providing huts, picnic sites, walking tracks, and other aids to recreational pursuits in State forests in Southland Conservancy; these developments have engendered a most favourable public reaction, especially on Stewart Island, where a round-trip walking trail has been very popular.

NOXIOUS ANIMALS CONTROL

Hunting force still inadequate—Despite labour being more readily available, the Forest Service is still unable to recruit enough experienced hunters to maintain adequate control of noxious animals in priority areas. Conservancies have stepped up on-job training, but many of the inexperienced men offering did not show promise and consequently recruitment and turnover remain high. In regions where there is likely to be a continuing shortage of skilled hunters it will be necessary to make greater use of helicopter hunting and other forms of control.

Brief details of the main conservancy operations are as follows:

(a) Control of goats in the Kaimai Range, the eastern Urewera, and Mt. Egmont has been continued. More hunters have been employed in Egmont National Park and there has been a marked increase in the number of goats killed. In the Urewera highlands official control efforts have been directed to the priority catchments draining to the Bay of Plenty; this policy and active sponsorship of private hunting have reduced deer numbers to less damaging levels. Damage by opossums to slip and stream-bank vegetation and the discontinuous kamahi forest is causing concern.

(b) Satisfactory progress has been maintained in the high-priority regions of the Kaweka, Ruahine, Tararua, and Rimutaka ranges, in the North Island, and in the Wairau and Hokitika catchments, in the South Island. Greater reliance is being placed on the use of helicopters in these areas, but the low animal densities now prevailing may prove unprofitable for commercial operations.

(c) Scientists of the Forest and Range Experiment Station reassessed the condition of the critical Hokitika and Waimakariri catchments during the year to determine the future level of control needed in these important areas. Large-scale poisoning, to control opossums and deer, was carried out in the Deception catchment of Arthurs Pass National Park.

(d) Routine control operations were continued in high-priority areas in Southland: the Takitimu and Eyre Mountains and the Dobson-Hopkins and Shotover catchments.

Control of deer in Fiordland—The National Parks Authority, after considering reports from the 1970 Forest Service scientific survey of the wapiti area of Fiordland National Park (see last year's report, page 31), has recommended increased hunting pressure on the overpopulated areas. A further immediate reduction of animal numbers by about 5,000 has been recommended. All of them, it is confidently expected, could be red deer and hybrids, which now infest the area. These recommendations and means of achieving herd reductions have not been well received by the New Zealand Deerstalkers' Association, which continues to press for game management policies and to ignore the national park values at risk. A solution to the impasse must be found soon.

Noxious animals in captivity—Applications from persons wishing to hold noxious animals for public display have steadied during the year. Many people are seeking additional animals to improve the attraction of their exhibits.

Interest in deer farming continues; 42 persons are now licensed or have provisional authority to develop deer farms to the standards that the regulations require. Some established deer farms now hold several hundred animals, and killing to supply venison for export has begun.

Opossum control to check bovine tuberculosis—Opossums on or near farms in the Buller and Inangahua districts were found by veterinary officers to be infected with bovine tuberculosis and considered a source of reinfection of cattle, from which the disease is being eradicated through a New Zealand - wide campaign. At the request of the Department of Agriculture the Forest Service established a special unit to

undertake intensive control of opossums on and adjacent to the farmlands. This programme will take a further 12 months to reduce opossum numbers to low levels.

GAME MEAT RECOVERY

A continuing strong overseas demand for New Zealand venison at an attractive price has encouraged all classes of hunters to maintain high hunting pressure, helicopter operators being particularly active. The lifting of import restrictions on helicopters has resulted in additional machines being bought and used on venison recovery. The intense pressure on all areas where operations are payable has forced companies to give increasing attention to recovery of thar and chamois. Until recently these species were hunted by commercial helicopters only during winter, when deer are harder to find. Since markets have opened up for chamois and thar meat large-scale operations against these animals have become routine. The decline in deer numbers on open range has induced helicopter hunters to give more attention to forested areas, formerly the preserve of commercial and recreational ground hunters.

OTHER ACTIVITIES

TRAINING

Forestry education and training—Twelve graduates from the first course at the Canterbury School of Forestry began duty at the end of 1971 as foresters in the Forest Service. Their induction into the Forest Service through a planned range of productive work experience will be spread over the first 1 to 2 years of their service and will be regarded as an extension of their university studies. Such a programme was not feasible when students were required to attend various overseas universities to obtain their forestry degrees. Post-graduate forestry study is required by the department in a variety of topics and will be sponsored at the Canterbury school on an initial basis of two students each year. During the present year, four departmental officers went overseas for post-graduate studies not yet available in New Zealand.

The programme of departmental training courses at the Forestry Training Centre, Rotorua, was broadened during the year to include human relations and forest administration; existing courses were updated to cover current knowledge on environmental forestry and, where applicable, to begin the introduction of metrication.

This year marked the twenty-first anniversary of the inception of the Woodsman Training Scheme, which started at Golden Downs in January 1951. The standard of the woodsmen emerging from the three schools remains high and their skill and versatility are recognised in the continuing demand for their services from within the Forest Service and from the timber industry in general.

Training for industry—Enrolments for all courses at the Timber Industry Training Centre, Rotorua, increased. More use was made of the centre by industry, the Forest Research Institute, and the Canterbury School of Forestry for sawmilling research and demonstration purposes. The centre is in a unique position to provide research facilities for the timber industry, which is unable to carry out this work effectively in its own sawmills without interruption of production. This important function is of growing importance to the industry and of no small benefit to the centre itself.

The Utilisation Development Division conducted residential courses at the training centre in timber utilisation, timber grading, timber seasoning, and wood preservation. These annual courses were again strongly supported by sawmillers, merchants, local bodies, and Government departments concerned with wood specification and use. The division also conducted a number of well attended 2-day courses throughout the country.

Apprentice training—More than twice the usual number of applications for trade apprenticeships in the Forest Service were received this year. The 21 applicants selected were of higher academic level than recruits in previous years. As the average length of apprenticeships is now less than 4 years, training must be more concentrated than formerly to achieve the required standards. The apprentice schools at Kaingaroa and Rotorua plant workshops have maintained their high standard of training, 83 percent of the apprentices passing their trade examinations.

WORKSHOPS BONUS SCHEME

A bonus incentive scheme planned by a firm of industrial consultants, which has been operating at the plant workshops at Rotorua during the year, has improved overall efficiency. Workshop operating costs have been significantly reduced and more plant and vehicle units have been serviced. Night shift work has been discontinued and overtime curtailed. A similar scheme is being investigated for the Waipa sawmill engineering workshops.

COMPUTER SERVICES

Changes at the Government Computer Centre necessitated redevelopment of programs and systems and restricted use of the centre's ICL machine, with consequent delay to processing. The data on resources for beech utilisation proposals were, however, completed, along with information on pilot logging trials.

The Elliott 503 computer was again used to process exotic forest inventory and permanent sample plot data, with enhancements to the latter system being only partly accomplished because of the above-mentioned processing changes.

The Forest Research Institute, Rotorua, handled considerable work expeditiously through its remote-entry batch-processing terminal, linked by leased telephone circuit to the Government Computer Centre ICL machine, Wellington. This is the first use of this type of terminal in New Zealand and at times there were severe difficulties. A similar terminal now installed in Head Office is awaiting connection.

There has been good progress in systems planning for compartment record information, which will make readily available essential data for forest management simulation studies and a variety of other uses. Other systems projects include conversion of log weight to volume, forest inventory, permanent sample plots, directory of standards codes, and simulation of forest management alternatives.

EXTERNAL AID

There was a notable expansion in forestry training of overseas personnel on behalf of the Food and Agriculture Organisation (FAO) of the United Nations, and under the Colombo Plan, Special Commonwealth African Assistance Plan (SCAAP), and the Government In-service Training Scheme for Pacific Islanders. Nineteen requests for training were received, over double that of previous years, from South Korea (4), Kenya (4), Guyana (3), Malaysia (2), Trinidad (2), Niue (1), Sierra Leone (1), India (1), and Fiji (1). Fourteen forest officers sponsored by these organisations completed their training, five remain under training, and programmes have been developed for a further four still to take up their awards. In addition to providing training the department undertook to investigate the expansion of aid to include the Economic Commission for Asia and the Far East (ECAFE) scheme.

OVERSEAS VISITS

The Director of the Commercial Division and the Director of the Marketing Division visited Japan, Korea, and Australia for sales consultations. The former also visited the U.K. for this purpose. The Director of the Marketing Division and the Marketing Manager, Commercial Division, made a further visit to Japan and Korea to negotiate log and timber prices. The Director of the Commercial Division and the Director of the Forest Economics Division attended New Zealand - Australia Free Trade Agreement talks in Canberra. The Principal Timber Officer was a member of the New Zealand delegation to the World Consultation on the Use of Timber in Housing, held in Canada. The Fire Protection Officer visited the United States at the invitation of the U.S. Forest Service to study fire operational research.

Other officers attended scientific and forestry conferences in Australia and France and there were the usual exchange visits to Australia by scientists of the Forest Research Institute. Towards the end of the year the Conservator of Forests, Invercargill, left to investigate logging research organisations in North America and Europe and report on their applicability in New Zealand. Two scientists of the Forest Research Institute began extensive study tours, one on toxicological research and the other on mensuration problems affecting forest management.

APPENDIX 1

Area of State Forest Land as at 31 March 1972

(Area in acres)

Conservancy	Permanent State Forest		Provisional State Forest		Total Area of State Forest Land	State Forest Land as Percentage of Total Land Area
	Ordinary	National Endowment	Ordinary	National Endowment		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Auckland ..	786,203	89,012	62,032	4,163	941,412	12.1
Rotorua ..	829,493	327,739	122,699	10,495	1,290,427	16.6
Wellington ..	1,279,783	41,466	37,394	3,152	1,361,797	10.5
Nelson ..	1,769,621	497,212	450,414	227,735	2,944,984	42.0
Westland ..	884,257	425,279	333,409	147,415	1,790,362	46.3
Canterbury ..	619,519	3,647	496	..	623,662	6.2
Southland ..	590,826	56,233	468,671	13,740	1,129,471	6.6
Total ..	6,759,702	1,440,588	1,475,115	406,700	10,082,115*	15.3

*Excludes 198,877 acres administered as State forest land.

Reservations and Withdrawals

	Acres
Land placed under State reservation	95,707
Areas withdrawn from reservation comprised—	
For settlement	6,505
For national parks	143,024
For roads	223
Other	5,105

APPENDIX 2

New Area Planted in State Exotic Forests—by Species

(Area in acres)

Year Ended 31 March	Radiata pine	Douglas fir	Corsican pine	Other	Total
(1)	(2)	(3)	(4)	(5)	(6)
1951 ..	730	680	550	2,130	4,090
1952 ..	2,260	550	710	1,510	5,030
1953 ..	2,690	850	910	1,220	5,670
1954 ..	2,860	740	430	900	4,930
1955 ..	2,960	1,320	480	550	5,310
1956 ..	4,260	1,200	550	690	6,700
1957 ..	3,740	1,680	640	940	7,000
1958 ..	3,920	2,320	1,010	1,230	8,480
1959 ..	2,130	2,090	1,480	1,420	7,120
1960 ..	2,560	1,680	1,080	1,830	7,150
1961 ..	4,760	2,120	880	1,880	9,640
1962 ..	6,550	2,260	1,490	1,470	11,770
1963 ..	9,080	1,850	2,030	2,220	15,180
1964 ..	12,540	1,840	2,096	1,916	18,392
1965 ..	14,695	3,881	1,361	1,498	21,435
1966 ..	15,110	3,048	2,085	304	20,547
1967 ..	15,220	4,113	1,143	747	21,223
1968 ..	17,762	4,962	427	722	23,873
1969 ..	25,303	5,909	671	1,452	33,335
1970 ..	29,024	5,353	474	1,687	36,538
1971 ..	31,317	3,545	240	1,314	36,416
1972 ..	32,707	2,175	67	846	35,795

APPENDIX 3

Establishment and Clear Felling in State Exotic Forests as at 31 March 1972—(a) by Forests

North Island

(Area in acres)

Conservancy and Forest	Stocked Area at 31 March 1971	Operations During Year			Other Changes in Stocked Area	Stocked Area at 31 March 1972	Area Awaiting Restocking	Total Productive Area
		New Area Planted	Former Productive Areas Restocked By Planting	Area Clear Felled with Yield				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Auckland—								
Athenree ..	1,481	..	146	67	— 13	1,547	80	1,627
Aupouri ..	4,123	1,506	180	28	— 32	5,749	32	5,781
Glenbervie ..	5,297	408	..	..	..	5,705	..	5,705
Great Barrier ..	102	..	..	..	..	102	..	102
Herekino ..	144	..	..	..	— 144	..	..	..
Hurakia ..	546	..	..	..	— 546	..	..	..
Katikati ..	47	..	..	..	..	47	..	47
Kauaeranga ..	1,093	3	..	..	..	1,096	..	1,096
Mangawhai ..	954	205	170	..	— 170	1,159	..	1,159
Maramarua ..	10,806	..	489	282	— 4	11,009	306	11,315
Omahuta ..	1,215	..	..	..	..	1,215	..	1,215
Puhipuhi ..	1,266	..	57	30	— 11	1,282	128	1,410
Puketi ..	266	..	..	..	..	266	..	266
Pureora ..	5,033	649	..	33	..	5,649	33	5,682
Raetea ..	14	..	..	..	— 14	..	..	..
Riverhead ..	10,002	..	705	523	— 10	10,174	523	10,697
Russell ..	94	..	..	..	..	94	..	94
Tairua ..	14,593	849	..	..	+ 20	15,462	1,156	16,618
Tanui-Kawhia ..	18	55	..	..	..	73	..	73
Waipoua ..	5,189	..	216	112	— 35	5,258	112	5,370
Waitangi ..	3,479	266	..	18	..	3,727	23	3,750
Waiuku ..	2,552	..	99	105	— 1	2,545	146	2,691
Whangapoua ..	5,552	592	50	..	— 731	5,463	..	5,463
Woodhill ..	13,819	864	162	62	+ 8	14,791	73	14,864
Total	87,685	5,397	2,274	1,260	—1,683	92,413	2,612	95,025
Rotorua—								
Haparangi ..	571	..	..	..	..	571	..	571
Horohoro ..	2,123	212	..	..	+ 2	2,337	..	2,337
Kaingaroa ..	301,687	1,382	4,200	5,566	— 386	301,317	11,193	312,510
Lake Taupo ..	5,572	3,785	..	..	— 4	9,353	..	9,353
Mangatu ..	13,512	1,053	..	..	— 11	14,554	..	14,554
Marotiri ..	383	..	..	..	..	383	..	383
Patunamu ..	4,381	266	1	— 1	— 1	4,646	..	4,646
Rotoehu ..	11,773	118	133	158	+ 249	12,115	220	12,335
Ruatoria ..	1,089	1,016	..	..	..	2,105	..	2,105
Tihoi ..	1,077	252	..	..	+ 1	1,330	..	1,330
Whaka ..	9,184	325	264	170	— 26	9,577	144	9,721
Wharerata ..	3,274	362	..	..	+ 20	3,656	..	3,656
Whirinaki ..	5,114	289	..	..	+ 49	5,452	7	5,459
Total	359,740	9,060	4,598	5,895	— 107	367,396	11,564	378,960
Wellington—								
Erua ..	4,175	..	..	..	..	4,175	18	4,193
Esk ..	6,439	797	..	..	— 17	7,219	..	7,219
Gwavas ..	9,400	710	32	149	..	9,993	133	10,126
Karioi ..	16,422	24	235	138	+ 32	16,575	763	17,338
Kaweka ..	6,219	961	..	..	— 12	7,168	..	7,168
Lismore ..	3,311	443	..	..	..	3,754	..	3,754
Mohaka ..	6,903	1,150	..	..	..	8,053	..	8,053
Motuiti ..	13	..	19	..	— 1	31	..	31
Mount Bruce ..	33	..	..	..	— 1	32	..	32
Ngaumu ..	13,522	564	..	..	— 16	14,070	..	14,070
Rangataua ..	880	..	..	..	+ 14	894	..	894
Ruahines ..	289	..	..	..	..	289	..	289
Santoft ..	4,428	458	99	84	— 301	4,600	376	4,976
Tangimoana ..	266	..	..	..	..	266	1	267
Tararua ..	881	..	..	..	..	881	..	881
Te Wera ..	2,295	..	..	..	..	2,295	..	2,295
Tinui ..	57	..	..	..	..	57	..	57
Tongariro ..	2,581	..	..	..	..	2,581	..	2,581
Waitarere ..	2,833	32	..	21	+ 90	2,934	160	3,094
Waituhui ..	468	82	..	..	+ 8	558	..	558
Rimutaka ..	..	101	..	..	..	101	..	101
Total ..	81,415	5,322	385	392	— 204	86,526	1,451	87,977
Total North Island, year ended 31 March—								
1972		19,779	7,257	7,547	—1,994	546,335	15,627	561,962
1971		22,179	6,726	7,693	—4,726	528,840	12,431	541,271
1970		20,989	3,192	6,463	—1,336	512,354	8,380	520,734
1969		19,477	5,621	5,652	—1,632	495,972	4,501	500,473
1968		14,278	5,332	5,154	— 73	478,158	5,388	483,546

APPENDIX 3—continued

ESTABLISHMENT AND CLEAR FELLING IN STATE EXOTIC FORESTS AS AT 31 MARCH 1972—(a) BY FORESTS—*continued*

South Island

(Area in acres)

Conservancy and Forest	Stocked Area at 31 March 1971	Operations During Year			Other Changes in Stocked Area	Stocked Area at 31 March 1972	Area Waiting Restocking	Total Productive Area
		New Area Planted	Former Productive Areas Restocked By Planting	Area Clear Felled with Yield				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Nelson—								
Dumgree ..	109	..	..	10	..	99	..	99
Golden Downs ..	51,522	1,831	1,509	2,289	+ 257	52,830	1,071	53,901
Hira ..	2,696	1,024	..	..	..	3,720	..	3,720
Hukawai ..	358	..	..	..	..	358	..	358
Inangahua West	14	..	..	..	..	14	..	14
Motueka ..	4,535	257	3	..	..	4,795	..	4,795
Rai-Whangamoa	5,950	465	..	..	..	6,415	..	6,415
Tawhai ..	1,128	62	..	..	− 23	1,167	..	1,167
Wairau ..	1,141	658	..	..	− 44	1,755	..	1,755
Waitahu ..	..	87	..	..	..	87	..	87
Total ..	67,453	4,384	1,512	2,299	+ 190	71,240	1,071	72,311
Westland—								
Granville ..	694	..	..	..	..	694	54	748
Hochstetter ..	2,870	116	..	..	..	2,986	..	2,986
Hohonu ..	120	..	..	..	..	120	..	120
Ianthe ..	316	62	..	..	− 20	358	20	378
Kaniere ..	376	..	..	..	..	376	1	377
Mahinapua ..	2,084	..	..	5	..	2,079	20	2,099
Mawhera ..	1,811	720	..	..	− 3	2,528	663	3,191
Nemona ..	1,889	192	..	..	− 84	1,997	84	2,081
Omoto ..	450	654	..	..	..	1,104	..	1,104
Paparoa ..	129	..	..	..	..	129	..	129
Waimea ..	2,510	62	..	..	− 20	2,552	20	2,572
Wanganui ..	61	..	..	..	..	61	..	61
Total ..	13,310	1,806	..	5	− 127	14,984	862	15,846
Canterbury—								
Ashley ..	9,666	707	70	16	+ 4	10,431	16	10,447
Balmoral ..	19,186	10	395	253	− 227	19,111	655	19,766
Eyrewell ..	10,213	..	846	447	..	10,612	5,544	16,156
Hanmer ..	9,034	..	76	72	+ 26	9,064	125	9,189
Island Hills ..	427	..	..	..	− 75	352	..	352
Kakahu ..	2,812	211	27	..	− 4	3,046	..	3,046
Mt. Thomas ..	222	248	22	..	− 22	470	..	470
Omihi ..	2,573	62	21	..	+ 31	2,687	262	2,949
Oxford ..	667	113	..	..	− 12	768	..	768
Pioneer Park ..	691	..	23	..	..	714	16	730
Raincliff ..	188	..	..	..	..	188	2	190
Total ..	55,679	1,351	1,480	788	− 279	57,443	6,620	64,063
Southland—								
Beaumont ..	4,675	38	234	232	..	4,715	..	4,715
Berwick ..	11,251	946	177	..	− 210	12,164	..	12,164
Catlins ..	566	..	..	..	..	566	..	566
Conical Hill ..	4,059	..	152	121	− 22	4,068	..	4,068
Dusky ..	4,109	..	..	6	+ 41	4,144	..	4,144
Herbert ..	3,049	87	66	31	− 61	3,110	..	3,110
Hinahina ..	249	112	67	..	+ 13	441	..	441
Hokonui ..	5,117	220	304	141	+ 8	5,508	..	5,508
Longwood ..	3,957	348	..	..	− 986	3,319	..	3,319
Maclennan ..	4	..	..	..	..	4	..	4
Naseby ..	3,277	87	39	31	..	3,372	..	3,372
Otago Coast ..	7,771	986	..	..	− 599	8,158	..	8,158
Otautau ..	8	..	..	..	..	8	..	8
Rankleburn ..	5,814	312	..	..	+ 164	6,290	..	6,290
Rowallan ..	1,456	224	..	..	..	1,680	..	1,680
Silver Peaks ..	703	120	..	..	..	823	..	823
Slopedown ..	1,390	459	797	..	− 41	2,605	..	2,605
Tapanui ..	1,919	..	93	36	− 12	1,964	..	1,964
Taringatura ..	..	350	..	..	..	350	..	350
Waikoata ..	252	218	48	..	− 4	514	..	514
Woodlaw ..	4,038	329	..	..	..	4,367	..	4,367
Total ..	63,664	4,836	1,977	598	−1,709	68,170	..	68,170
Total South Island, year ended 31 March—								
1972	12,377	4,969	3,690	−1,925	211,837	8,553	220,390	
1971	14,237	2,173	3,191	− 710	200,106	11,204	211,310	
1970	15,549	2,126	3,414	+ 221	187,597	8,286	195,883	
1969	13,858	2,967	2,388	+1,103	173,115	8,108	181,223	
1968	9,595	2,401	1,267	−2,079	157,575	10,824	168,399	
Total New Zealand, year ended 31 March—								
1972	32,156	12,226	11,237	−3,919	758,172	24,180	782,352	
1971	36,416	8,899	10,884	−5,436	728,946	23,635	752,581	
1970	36,538	5,318	9,877	−1,115	699,951	16,666	716,617	
1969	33,335	8,588	8,040	− 529	669,087	12,609	681,696	
1968	23,873	7,733	6,421	−2,152	635,733	16,212	651,945	

APPENDIX 3—continued

Establishment and Clear Felling in State Exotic Forests as at 31 March 1972—(b) by Species

(Area in acres)

Conservancy and Species	Stocked Area at 31 March 1971	Operations During Year			Other Changes in Stocked Area	Stocked Area at 31 March 1972
		New Area Planted	Former Productive Areas Restocked by Planting	Area Clear Felled with Yield		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Auckland—						
Radiata pine ..	63,210	5,020	2,235	910	− 880	68,675
Douglas fir ..	3,581	343	..	..	..	3,924
Corsican pine ..	5,765	..	..	173	− 22	5,570
Other species ..	15,129	34	39	177	− 781	14,244
Total ..	87,685	5,397	2,274	1,260	−1,683	92,413
Rotorua—						
Radiata pine ..	189,088	8,218	4,092	4,016	+1,388	198,770
Douglas fir ..	53,691	677	453	209	+ 2	54,614
Corsican pine ..	31,788	..	..	610	− 768	30,410
Other species ..	85,173	165	53	1,060	− 729	83,602
Total ..	359,740	9,060	4,598	5,895	− 107	367,396
Wellington—						
Radiata pine ..	39,496	4,846	284	248	− 253	44,125
Douglas fir ..	13,623	366	98	7	− 131	13,949
Corsican pine ..	7,129	..	..	58	− 33	7,038
Other species ..	21,167	110	3	79	+ 213	21,414
Total ..	81,415	5,322	385	392	− 204	86,526
Nelson—						
Radiata pine ..	42,439	3,872	1,446	1,570	+ 746	46,933
Douglas fir ..	11,835	456	21	73	− 385	11,854
Corsican pine ..	7,171	..	..	307	− 51	6,813
Other species ..	6,008	56	45	349	− 120	5,640
Total ..	67,453	4,384	1,512	2,299	+ 190	71,240
Westland—						
Radiata pine ..	8,241	1,574	..	5	− 23	9,787
Douglas fir ..	1,014	112	..	..	..	1,126
Corsican pine ..	296	..	..	..	..	296
Other species ..	3,759	120	..	..	− 104	3,775
Total ..	13,310	1,806	..	5	− 127	14,984
Canterbury—						
Radiata pine ..	30,768	1,205	1,408	734	− 28	32,619
Douglas fir ..	5,518	98	21	..	− 67	5,570
Corsican pine ..	10,752	..	..	27	− 13	10,712
Other species ..	8,641	48	51	27	− 171	8,542
Total ..	55,679	1,351	1,480	788	− 279	57,443
Southland—						
Radiata pine ..	39,096	4,391	1,749	284	−1,023	43,929
Douglas fir ..	7,559	123	87	5	− 232	7,532
Corsican pine ..	9,964	67	..	117	− 273	9,641
Other species ..	7,045	255	141	192	− 181	7,068
Total ..	63,664	4,836	1,977	598	−1,709	68,170
New Zealand—						
Radiata pine ..	412,338	29,126	11,214	7,767	− 73	444,838
Douglas fir ..	96,821	2,175	680	294	− 813	98,569
Corsican pine ..	72,865	67	..	1,292	−1,160	70,480
Other species ..	146,922	788	332	1,884	−1,873	144,285
Total ..	728,946	32,156	12,226	11,237	−3,919	758,172

Notes—(1) Non-productive afforestation for erosion control is excluded from this appendix.
(2) "Other changes" (column 6) includes purchase or sale of stocked forest, previous year's seeding or regeneration now considered established, clear felling without yield, losses due to fire, corrections due to resurvey, etc.

APPENDIX 4

Pruning and Thinning in State Exotic Forests for the Year Ended 31 March 1972

(Area in acres)

Conservancy and Species	Pruning					Thinned During Year	
	Area Pruned During Year			Total Pruned Area to Date			
	Total Area Pruned	To First Log	To Second Log	To First Log	To Second Log	With Yield	Other
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Auckland—							
Radiata pine ..	1,727	360	..	12,148	1,909	720	993
Douglas fir ..	..	..	..	263	..	..	..
Corsican pine ..	..	..	..	217	..	..	..
Other species ..	77	36	..	2,868	357	28	4
Total ..	1,804	396	..	15,496	2,266	748	997
Rotorua—							
Radiata pine ..	21,411	6,395	..	30,410	1,272	1,607	12,781
Douglas fir ..	5	..	..	10,012	17	2,130	..
Corsican pine ..	..	..	..	5,284	131	..	..
Other species ..	12	..	..	6,672	22	40	4
Total ..	21,428	6,395	..	52,378	1,442	3,777	12,785
Wellington—							
Radiata pine ..	3,943	1,296	1	8,986	150	895	1,714
Douglas fir ..	..	..	..	714	..	6	..
Corsican pine ..	..	..	..	592	270	1	..
Other species ..	52	..	..	6,150	24	45	49
Total ..	3,995	1,296	1	16,442	444	947	1,763
Nelson—							
Radiata pine ..	1,349	139	..	4,697	337	19	1,887
Douglas fir ..	32	..	..	2,617	..	40	17
Corsican pine ..	..	..	..	4,074	..	..	..
Other species ..	..	4	..	276	..	..	31
Total ..	1,381	143	..	11,664	337	59	1,935
Westland—							
Radiata pine ..	1,233	..	..	403	128	..	482
Douglas fir ..	11	..	..	80	..	..	..
Corsican pine ..	..	..	..	..	..	..	..
Other species ..	29	..	..	390	..	..	..
Total ..	1,273	..	..	873	128	..	482
Canterbury—							
Radiata pine ..	2,329	1,100	..	3,746	1,424	227	927
Douglas fir ..	20	1	..	440	..	12	..
Corsican pine ..	10	..	..	2,859	6	62	406
Other species ..	35	6	..	642	..	47	33
Total ..	2,394	1,107	..	7,687	1,430	348	1,366
Southland—							
Radiata pine ..	3,043	1,006	..	7,223	88	125	1,413
Douglas fir ..	22	..	..	623	..	29	59
Corsican pine ..	..	..	..	1,792	13	50	..
Other species ..	2	..	..	1,997	41	2	..
Total ..	3,067	1,006	..	11,635	142	206	1,472
New Zealand—							
Radiata pine ..	35,035	10,296	1	67,613	5,308	3,593	20,197
Douglas fir ..	90	1	..	14,749	17	2,217	76
Corsican pine ..	10	..	..	14,818	420	113	406
Other species ..	207	46	..	18,995	444	162	121
Total ..	35,342	10,343	1	116,175	6,189	6,085	20,800

Notes—(1) "Total Area Pruned" (column 2) includes pruning to intermediate steps, e.g., 0–9 ft, 18–27 ft. (2) "To First Log" (columns 3 and 5) is pruning reaching 16–20 ft. "To Second Log" (columns 4 and 6) is pruning reaching 32 ft.

(3) Where pruning has gone from below first log up to second log in one operation the area has been included in columns (3) and (4).

APPENDIX 5

Protection Forestry—Principal Regions Under Control Operations, 1971–72

Region	Area (acres)	Control Objectives
Urewera forests, including Urewera National Park ..	1,659,000	Erosion and flood control.
Kaweka Range	278,000	,,
Egmont National Park ..	83,000	Protection of indigenous flora and fauna; soil and water conservation.
Ruahine Range	353,000	Erosion and flood control.
Tararua Range	235,000	,,
Wairau catchment	1,307,000	,,
Awatere-Clarence* catchments	1,000,000	Reduce competition of noxious animals with domestic stock.
Motueka catchment ..	200,000	Erosion and flood control.
Buller catchment*	200,000	,,
Hokitika catchment.. ..	293,000	,,
Taramakau catchment ..	12,000	,,
Waiau catchment*	447,000	Reduce competition of noxious animals with domestic stock.
Hurunui catchment* ..	265,000	Erosion and flood control.
Waimakariri catchment ..	596,000	,,
Rakaia catchment*.. ..	349,000	,,
Rangitata catchment* ..	145,000	,,
Kaikoura region	10,000	,,
Waitaki catchment* ..	991,000	,,
Murchison Mountains, Fiordland National Park ..	130,000	Protection of indigenous flora and fauna (including takahe).
Eyre-Takitimu Mountains ..	720,000	Erosion and flood control.
Total	9,273,000	

*Inspected annually—intermittent control where necessary.

APPENDIX 6

Total Timber Removals from Indigenous and Exotic State Forests for the Year Ended 31 March 1972

(Volume in thousand cubic feet)

Conservancy	Indigenous			Exotic			Grand Total
	Logs	Smallwood	Total	Logs	Smallwood	Total	
Auckland ..	2,536	15	2,551	7,590	833	8,423	10,974
Rotorua ..	4,536	19	4,555	66,381	942	67,323	71,878
Wellington ..	1,306	10	1,316	2,172	533	2,705	4,021
Nelson ..	2,541	37	2,578	15,887	36	15,923	18,501
Westland ..	6,254	34	6,288	..	..	..	6,288
Canterbury ..	..	..	..	4,175	345	4,520	4,520
Southland ..	1,251	5	1,256	4,756	447	5,203	6,459
Total—1971–72 ..	18,424	120	18,544	100,961	3,136	104,097	122,641
1970–71 ..	18,900	138	19,038	101,753	4,456	106,209	125,247
1969–70 ..	16,143	140	16,283	91,922	3,586	95,508	111,791

Notes—(1) This table shows all roundwood removed from State forests under licences, permits, and log sale agreements.
(2) Roundwood for particle board production is included with logs.

APPENDIX 7

Total Smallwood Removals from State Forests

(Volume in thousand cubic feet)

Category	Year Ended 31 March				
	1968	1969	1970	1971	1972
(1)	(2)	(3)	(4)	(5)	(6)
Posts—					
Indigenous	34	37	21	34	30
Exotic	1,283	1,681	2,760	3,547	2,479
Total	1,317	1,718	2,781	3,581	2,509
Other Fencing Material—					
Indigenous	77	33	28	31	15
Exotic	104	213	200	274	163
Total	181	246	228	305	178
Poles—					
Indigenous	6	2	..	2	2
Exotic	496	206	518	462	332
Total	502	208	518	464	334
Other—					
Indigenous	285	160	91	71	73
Exotic	192	165	108	173	162
Total	477	325	199	244	235
Total Smallwood—					
Indigenous	402	232	140	138	119
Exotic	2,075	2,265	3,586	4,456	3,137
Total	2,477	2,497	3,726	4,594	3,256

Note—Chipwood for particle board production is excluded from this table and is included with "Logs" in appendix 6.

APPENDIX 8

Total Timber Removals from State Indigenous Forests by Method of Sale for the Year Ended 31 March 1972

(Volume in thousand cubic feet; Value in $(000))

Conservancy	Logs		Smallwood		Total	
	Volume	Value	Volume	Value	Volume	Value
(1)	(2)	(3)	(4)	(5)	(6)	(7)
(a) *Sales of Standing Timber*						
Auckland	1,597	225	15	1	1,612	226
Rotorua	2,954	208	19	1	2,973	209
Wellington	1,306	199	10	2	1,316	201
Nelson	2,283	140	32	1	2,315	141
Westland	5,382	313	34	3	5,416	316
Canterbury	..	..	..	..	..	..
Southland	1,250	116	5	..	1,255	116
Total—1971–72	14,772	1,201	115	8	14,887	1,209
1970–71	15,394	1,315	138	7	15,532	1,322
1969–70	13,286	1,265	140	8	13,426	1,273
(b) *Sales of Logs*						
Auckland	939	334	..	..	939	334
Rotorua	1,582	571	..	..	1,582	571
Wellington	..	..	..	..	..	..
Nelson	258	16	5	1	263	17
Westland	872	208	..	..	872	208
Canterbury	..	..	..	..	..	..
Southland	1	..	..	..	1	..
Total—1971–72	3,652	1,129	5	1	3,657	1,130
1970–71	3,506	1,017	..	..	3,507	1,017
1969–70	2,857	900	..	..	2,857	900

Notes—(1) Logs include saw logs and peeler logs.
(2) Values of log sales are based on price points that vary from "on ride" to "on truck" to "delivered mill". The value of log sales shown in this table is less than that shown in appendix 16, which is of cash receipts that include transport and other costs.

APPENDIX 9

Total Timber Removals from State Exotic Forests by Method of Sale for the Year Ended 31 March 1972

(Volume in thousand cubic feet; Value in $(000))

Conservancy	Logs		Smallwood		Total	
	Volume	Value	Volume	Value	Volume	Value
(1)	(2)	(3)	(4)	(5)	(6)	(7)
(a) *Sales of Standing Timber*						
Auckland	5,077	404	832	34	5,909	438
Rotorua	36,358	1,232	495	25	36,853	1,257
Wellington	1,344	92	532	34	1,876	126
Nelson	1,769	52	3	..	1,772	52
Westland	..	..	..	..	..	..
Canterbury	3,824	393	195	11	4,019	404
Southland	1,021	95	301	22	1,322	117
Total—1971–72 ..	49,393	2,268	21,358	126	51,751	2,394
1970–71 ..	51,040	2,188	2,875	149	53,915	2,337
1969–70 ..	46,082	1,908	2,260	102	48,342	2,010
(b) *Sales of Logs*						
Auckland	2,513	547	1	..	2,514	547
Rotorua	30,023	5,159	447	93	30,470	5,252
Wellington	828	167	1	..	829	167
Nelson	14,118	2,349	33	1	14,151	2,350
Westland	44	1	..	..	44	1
Canterbury	351	56	150	27	501	83
Southland	3,735	593	146	39	3,881	632
Total—1971–72 ..	51,612	8,872	778	160	52,390	9,032
1970–71 ..	50,713	8,229	1,581	283	52,294	8,512
1969–70 ..	45,840	7,517	1,326	295	47,166	7,812

Notes—(1) Logs include saw logs, pulp logs, and peeler logs.
(2) This appendix has been adjusted to exclude any log exports by contractors from sales of standing timber and to include them in the sales of logs. Tables (a) and (b) have been corrected for the years shown.
(3) Values of log sales are based on price points that vary from "on ride" to "on truck" to "delivered mill or wharf". The value of log sales shown in this table is less than that shown in appendix 16, which is of cash receipts that include transport and other costs.

APPENDIX 10

Removals of Exotic Roundwood from State Forests by Thinnings and Clear Fellings

(Volume in thousand cubic feet)

Forest	Year Ended 31 March 1972					1970–71
	Logs		Smallwood		Total	
	Thinnings	Clear Fellings	Thinnings	Clear Fellings		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Athenree	..	209	..	36	245	146
Aupouri	..	28	..	46	74	97
Glenbervie	39	..	110	..	149	117
Kauaeranga	9	..	..	..	9	..
Mangawhai	..	..	..	..	..	..
Maramarua	9	2,275	70	7	2,361	2,101
Omahuta	..	..	7	..	7	6
Puhipuhi	..	307	..	12	319	149
Riverhead	..	2,923	..	5	2,928	2,587
Tairua	3	..	20	..	23	..
Waipoua	..	95	..	129	224	141
Waitangi	29	53	57	2	141	65
Waiuku	74	376	153	23	626	570
Whangapoua	..	..	..	..	..	5
Woodhill	1,085	75	99	39	1,298	1,711
Others*	..	2	..	17	19	..
Kaingaroa	11,904	51,670	329	531	64,434	68,734
Mangatu	..	..	..	..	..	..
Patunamu	..	50	..	9	59	110
Rotoehu	14	1,047	..	..	1,061	1,321
Ruatoria	..	..	..	..	..	3
Whaka	593	1,103	4	69	1,769	1,781
Whirinaki	..	..	..	..	..	..
Esk	9	..	3	..	12	55
Gwavas	138	485	22	34	679	454
Karioi	76	802	69	126	1,073	1,467
Kaweka	..	..	..	..	..	24
Lismore	..	..	3	..	3	..
Motuiti	16	..	..	..	16	11
Ngaumu	..	28	215	..	243	320
Santoft	..	246	28	..	274	523
Tangimoana	2	..	6	..	8	..
Te Wera	..	..	4	..	4	8
Tongariro	..	..	..	..	..	3
Waitarere	288	82	23	..	393	420
North Island	14,288	61,856	1,222	1,085	78,451	82,929
Dumgree	..	69	..	..	69	52
Golden Downs	12	15,801	..	33	15,846	13,018
Rai-Whangamoa ..	6	..	..	..	6	190
Others*	..	..	3	..	3	1
Mahinapua	..	44	..	..	44	36
Ashley	31	136	25	9	201	262
Balmoral	3	1,230	23	5	1,261	854
Eyrewell	..	1,719	..	26	1,745	2,084
Hanmer	398	543	164	65	1,170	1,085
Raincliff	116	..	..	..	116	1
Others*	..	..	27	..	27	9
Beaumont	..	2,271	..	..	2,271	1,646
Conical Hill	36	839	..	158	1,033	1,090
Dusky	106	21	..	2	129	298
Herbert	2	..	6	33	41	43
Hokonui	231	538	53	83	905	1,664
Longwood	5	..	33	..	38	49
Naseby	17	154	46	7	224	241
Tapanui	37	455	..	..	492	624
Others*	44	..	25	..	69	33
South Island	1,044	23,820	405	421	25,690	23,280
New Zealand	15,332	85,676	1,627	1,506	104,141	106,209

*Includes forests producing less than 10,000 cu ft.

APPENDIX 11

New Zealand Forest Service Sawmilling Operations

(a) *Production of Sawn Timber**

(Volume in thousand board feet)

Sawmill	Year Ended 31 December				
	1967	1968	1969	1970	1971
(1)	(2)	(3)	(4)	(5)	(6)
Waipa	30,358	40,329	45,354	44,977	44,230
Conical Hill	7,637	8,870	8,839	10,276	11,190
Total production ..	37,995	49,199	54,193	55,253	55,420

*Includes sleepers (609,000 bd ft in 1971).

(b) *Sales of Sawn Timber*

(Volume in thousand board feet)

Details	Year Ended 31 December				
	1967	1968	1969	1970	1971
(1)	(2)	(3)	(4)	(5)	(6)
New Zealand sales—					
Green	11,514	11,312	10,770	12,247	13,312
Air seasoned	2,431	1,948	2,262	3,527	3,050
Kiln dried	1,559	1,510	1,953	1,953	2,324
Treated—					
Wet	7,823	10,335	12,054	11,757	11,851
Dry	3,401	1,106	967	1,287	1,626
Total	26,728	26,211	28,006	30,771	32,163
Export sales—					
Green	4,732	16,366	17,529	15,964	15,920
Air seasoned	53	185	145	3,529	2,103
Kiln dried	1,167	1,018	1,280	959	730
Treated	225	81	939	2,528	1,538
Total	6,177	17,650	19,893	22,980	20,291
Transfers to box factory ..	1,345	1,547	1,331	948	1,515
Grand total ..	34,250	45,408	49,230	54,699	53,969

(c) *Subsidiary Processing of Sawn Timber*

Year Ended 31 December 1971

	bd ft
Quantity kiln dried	8,766,000
Quantity dressed	20,109,000
Quantity preservative treated* ..	13,577,000

*For further details see appendix 12.

APPENDIX 12

Forest Produce Treated by the New Zealand Forest Service

(a) *Sawn Timber*

(Volume in thousand board feet)

Location of Plant and/or Year	Preservative				Total
	Boron	Creosote	Boliden	PCP*/Fuel Oil	
(1)	(2)	(3)	(4)	(5)	(6)
Waipa	8,046	..	3,674	82	11,802
Conical Hill	1,775	..	..	..	1,775
Total, year ended 31 December—					
1971	9,821	..	3,674	82	13,577
1970	12,328	..	3,885	61	16,274
1969	12,202	..	3,974	58	16,234
1968	11,479	..	2,882	102	14,463
1967	8,898	..	2,731	79	11,708

*Pentachlorophenol.

(b) *Other Timber*

Type and Year	Hanmer	Waipa		Total	
	PCP*/Fuel Oil	Boliden	PCP*/Fuel Oil	Quantity	Volume
(1)	(2)	(3)	(4)	(5)	(6)
	Quantities in thousands				000 cu ft
Poles	4.7	4.4	14.4	23.5	201.5
Stockyard posts	5.0	..	0.3	5.3	10.5
Fencing posts	65.3	255.2	90.7	411.2	291.5
Strainers	4.4	5.6	4.9	14.9	36.8
Stays	1.8	3.1	1.5	6.4	6.3
Sawn battens	..	898.0	6.8	904.8	84.6
Sleepers†	..	..	83.8	83.8	195.4
Other	..	1.2	4.0	5.2	10.9
Total, year ended 31 December—	(Volume in thousand cubic feet)				
1971	93	304	440	N.A.	837
1970	118	282	401	N.A.	801
1969	122	242	413	N.A.	777
1968	93	189	484	N.A.	766
1967	104	144	675	N.A.	923

*Pentachlorophenol. †Excluding rejects.

APPENDIX 13

Employment and Training

(a) *Staff and Labour*

Category (1)	Strength, 31 March 1971 (2)	Commenced During Year (3)	Left During Year (4)	Strength, 31 March 1972 (5)
Staff	2,592*	415	362	2,645
Labour—				
Thinning, logging, milling ..	898	510	603	805
Other forestry operations ..	1,335	2,905	2,692	1,548
Control of noxious animals ..	87	214	191	110
Cadet woodsmen	..	115	24	91
Total	2,320	3,744	3,510	2,554
Total staff and labour ..	4,912	4,159	3,872	5,199

*Includes 47 on leave without pay and 3 on secondment. These have not been included in the estimates of expenditure.

(b) *Training*

Category (1)	Year Ended 31 March 1970 (2)	1971 (3)	1972 (4)
Technical trainees—			
Recruited during year	43	45	40
Studying for degrees in New Zealand ..	29	58	48
Studying for degrees overseas ..	6	..	..
Under field training	50	62	63
At ranger schools	20	28	31
Research technicians—			
Recruited during year	16	16	13
Under training	52	38	36
Woodsmen—			
Recruited during year	121	111	115
At woodsmen schools	238	166	177
Clerical cadets—			
Recruited	27	18	37

REPORT OF THE AUDIT OFFICE

To the Director-General of Forests.

The Audit Office, acting under statutory authority, has audited the accounts of the Waipa Sawmill for the year ended 31 December 1971.

The audit included such reviews of the accounting procedures and tests of the accounting records and other supporting evidence as were considered necessary in terms of section 20, Public Revenues Act 1953. All the information and explanations required have been obtained. The financial transactions which have come under notice have been within statutory authority.

In the opinion of the Audit Office the attached balance sheet and accompanying accounts give a true and fair view of the state of affairs of the Waipa Sawmill as at 31 December 1971 and of the results of the financial operations for the year.

G. J. CONNELLY,
Deputy Controller and Auditor-General.

1 June 1972.

APPENDIX 14

Forest Service Sawmill Accounts

(A) WAIPA SAWMILL

(a) *Operating Account for Year Ended 31 December 1971*

Year Ended 31 December 1970			Year Ended 31 December 1971	
$	$		$	$
5,792,915		Purchase of materials	6,038,001	
1,942,236		Wages, salaries, and contract payments	2,233,547	
163,057		Depreciation	235,990	
1,316,554		Other expenses	1,407,797	
	9,214,762			9,915,335
9,305,607		Sales of sawn timber, box shooks, and round produce (net)	10,171,645	
224,242		Increase in stocks	103,518	
	9,529,849			10,275,163
	$315,087	Net profit transferred to Appropriation Account		$359,828

(b) *Profit and Loss Appropriation Account for Year Ended 31 December 1971*

$	$		$	$
315,087		Net profit from Operating Account	359,828	
5,061		Profit on sale and disposal of assets	861	
	320,148			360,689
		Less—		
59,424		Interest on capital	61,181	
2,326		Payroll tax	11,911	
424		Transfer to fire insurance reserve	9,688	
	62,174			82,780
	257,974	Profit for year		277,909
	1,952,265	Balance 1 January 1971		2,210,239
	$2,210,239	Accumulated profits		$2,488,148

APPENDIX 14—continued

(A) Waipa Sawmill—*continued*

(c) *Balance Sheet as at 31 December 1971*

Year Ended 31 December 1970			Year Ended 31 December 1971	
$	$		$	$
		Current assets—		
		Sundry debtors—		
1,074,359		Trading accounts	1,558,686	
463,257		Other departmental undertakings	51,205	
1,537,616			1,609,891	
15,239		Insurance premium and other payments in advance	4,094	
1,552,855			1,613,985	
4,642		*Less* discount reserve	5,136	
1,548,213			1,608,849	
10,000		*Less* bad debt reserve	10,000	
	1,538,213			1,598,849
		Stocks and stores on hand (at cost)—		
40,245		Logs	4,117	
1,262,491		Sawn timber	1,305,371	
3,989		Box shooks	5,491	
46,910		Borax, pentachlorophenol	21,708	
7,106		Fuel oil	7,018	
78,845		Boliden salts	54,054	
157,384		Treated produce	260,174	
191,507		General stores	241,102	
138,673		Untreated produce	118,784	
	1,927,150			2,017,819
	3,465,363			3,616,668
		Fixed assets (at cost)—		
3,642,727		Plant	4,112,585	
2,374,254		*Less* provision for depreciation (ordinary)	2,521,684	
67,128		*Less* provision for depreciation (special)	62,240	
	1,201,345			1,528,661
1,368,139		Buildings	1,326,622	
602,689		*Less* provision for depreciation (ordinary)	600,777	
21,776		*Less* provision for depreciation (special)	18,718	
	743,674			707,127
105,993		Tools, furniture, and fittings	111,247	
56,085		*Less* provision for depreciation (ordinary)	60,081	
	49,908			51,166
622,025		Other installations	652,084	
243,051		*Less* provision for depreciation (ordinary)	252,581	
5,936		*Less* provision for depreciation (special)	5,936	
	373,038			393,567
	$5,833,328			$6,297,189
$	$		$	$
		Current liabilities—		
		Sundry creditors—		
1,197,917		Trade accounts	1,582,786	
..		Provision for taxation	..	
	1,197,917			1,582,786
		Funds and reserves—		
2,198,885		Advances of Government funds	2,001,387	
2,210,239		Accumulated profits	2,488,148	
200,000		Reserve for fire losses	200,000	
7,333		General reserve	7,333	
18,954		Reserve for fleet maintenance	17,535	
	4,635,411			4,714,403
	$5,833,328			$6,297,189

Certified correct—

A. W. Oakley, General Manager.
C. A. Cameron, Mill Accountant.

REPORT OF THE AUDIT OFFICE

To the Director-General of Forests.

The Audit Office, acting under statutory authority, has audited the accounts of the Conical Hill Sawmill for the year ended 31 December 1971.

The audit included such reviews of the accounting procedures and tests of the accounting records and other supporting evidence as were considered necessary in terms of section 20, Public Revenues Act 1953. All the information and explanations required have been obtained. The financial transactions which have come under notice have been within statutory authority.

In the opinion of the Audit Office the attached balance sheet and accompanying accounts give a true and fair view of the state of affairs of the Conical Hill Sawmill as at 31 December 1971 and of the results of the financial operations for the year.

G. J. Connelly,
Deputy Controller and Auditor-General.

1 June 1972.

APPENDIX 14—continued

(B) Conical Hill Sawmill

(a) *Operating Account for Year Ended 31 December 1971*

Year Ended 31 December 1970			Year Ended 31 December 1971	
$	$		$	$
297,114		Purchase of materials	360,471	
291,364		Wages, salaries, and contract payments	385,887	
37,722		Depreciation	47,240	
329,641		Other expenses	326,538	
	955,841			1,120,136
1,006,266		Sale of sawn timber (net)	1,053,707	
34,624		Increase in stocks	121,725	
	1,040,890			1,175,432
	$85,049	Net profit transferred to Appropriation Account		$55,296

(b) *Profit and Loss Appropriation Account for Year Ended 31 December 1971*

$	$		$	$
	85,049	Net profit from operating account		55,296
		Less—		
..		Loss on sale and disposal of assets	949	
14,691		Interest on capital	16,767	
1,400		Income tax provision	..	
	16,091			17,716
	68,958	Profit for year	37,580	
	198,453	Balance brought forward from previous year	267,411	
	..	*Plus* income tax provision reversal	1,400	
				268,811
	$267,411			$306,391

APPENDIX 14—continued

(B) Conical Hill Sawmill—*continued*

(c) *Balance Sheet as at 31 December 1971*

Year Ended 31 December 1970			Year Ended 31 December 1971	
$	$		$	$
		Current assets—		
		Debtors—		
213,323		Trading account	286,288	
17,085		Other departmental undertakings	29,890	
230,408			316,178	
929		*Less* discount reserve	1,160	
229,479			315,018	
3,000		*Less* bad debt reserve	3,000	
	226,479			312,018
		Stocks and stores on hand at cost—		
5,652		Logs	8,673	
247,442		Sawn timber	358,839	
1,356		Chemicals	20,015	
..		Round produce	7,307	
52,384		General stores	61,581	
	306,834			456,415
	533,313			768,433
		Fixed assets at cost—		
837,692		Plant	951,871	
415,556		*Less* provision for depreciation (ordinary)	438,543	
57,982		*Less* provision for depreciation (special)	57,982	
	364,154			455,346
446,112		Buildings	462,520	
178,758		*Less* provision for depreciation (ordinary)	189,948	
38,352		*Less* provision for depreciation (special)	38,352	
	229,002			234,220
17,934		Tools, furniture, and fittings	19,473	
6,140		*Less* provision for depreciation (ordinary)	6,220	
	11,794			13,253
202,551		Other installations	211,742	
54,165		*Less* provision for depreciation (ordinary)	55,194	
	148,386			156,548
	$1,286,649			$1,627,800
$	$		$	$
		Current liabilities—		
		Sundry creditors—		
91,996		Trading account	303,410	
1,400		Provision for taxation	..	
	93,396			303,410
		Funds and reserves—		
884,971		Advances on Government funds	976,441	
267,411		Accumulated profits	306,391	
31,713		Reserve for fire losses	31,612	
8,040		Reserve for fleet maintenance	8,829	
1,118		General reserve	1,117	
	1,193,253			1,324,390
	$1,286,649			$1,627,800

Certified correct—

J. D. Coyle, General Manager.

J. C. Williams, Secretary and Accountant.

REPORT OF THE AUDIT OFFICE

To the Director-General of Forests.

The Audit Office, acting under statutory authority, has audited the accounts of the New Zealand Forest Service for the year ended 31 December 1971.

The audit included such reviews of the accounting procedures and tests of the accounting records and other supporting evidence as were considered necessary in terms of section 20, Public Revenues Act 1953. All the information and explanations required have been obtained. The financial transactions which have come under notice have been within statutory authority.

In the opinion of the Audit Office the attached balance sheet and accompanying accounts give a true and fair view of the state of affairs of the Forest Service as at 31 December 1971 and of the results of the financial operations for the year.

G. J. Connelly,
Deputy Controller and Auditor-General.

1 June 1972.

APPENDIX 15

New Zealand Forest Service Accounts for the Year Ended 31 December 1971

(a) *General Administration Account*

Year Ended 31 December 1970			Year Ended 31 December 1971	
$	$		$	$
		Charges incurred directly in respect of—		
64,931		Fire prevention and precaution and administration of fire districts	58,539	
1,815,971		Technical investigations, research, etc.	2,318,832	
22,443		Assistance to public and private forestry	117,193	
126,885		Timber inspection and termite control	137,907	
460,147		Control of noxious animals	508,381	
698,043		Work for other departments	531,888	
291,301		Staff training, including Rotorua training centre	277,406	
192,856		Payments to local authorities for roading purposes (fifths)	245,427	
3,672,577			4,195,573	
667,021		*Less* fees for inspection, recoveries from other departments, etc.	471,860	
	3,005,556			3,723,713
		General administration expenses—		
2,928,255		Staff expenses, including salaries, overtime, travelling, and general expenses	3,204,074	
354,621		Office expenses, including postages, stationery, and general expenses	501,033	
444,679		Maintenance and depreciation of administrative buildings, equipment, etc.	363,487	
312,176		Miscellaneous general expenses	144,298	
4,039,731			4,212,892	
1,834,540		*Less* amounts charged against forests and other activities as "overhead"	2,231,308	
2,473		*Less* amounts charged against mills as "overhead"	14,041	
	2,202,718			1,967,543
	5,208,274			5,691,256
	26,727	*Less* miscellaneous revenue		36,034
	$5,181,547	Net deficit in Administration Account transferred to Consolidated Revenue Account in balance sheet		$5,655,222

(b) *Forest Development and Management Accounts (Excluding Waipa and Conical Hill Sawmills)*

Year Ended 31 December 1970			Year Ended 31 December 1971	
$	$		$	$
3,455,326		Establishment	3,382,122	
1,002,811		Tending	1,189,087	
578,802		Protection	619,304	
4,038,322		Maintenance of assets and miscellaneous expenses	5,207,546	
765,910		Depreciation of assets	383,939	
1,834,540		Overhead charged to forests and credited to General Administration Account	2,231,308	
5,601,945		Cost of utilisation	7,646,017	
	17,277,656			20,659,323
		Less—		
11,879,470		Sale of logs	12,458,754	
2,360,901		Sales of standing timber	2,718,996	
28,048		Miscellaneous revenue	179,614	
	14,268,419			15,357,364
	$3,009,237	Net costs transferred to "Development and management" in the balance sheet		$5,301,959

APPENDIX 15—continued

New Zealand Forest Service Accounts for the Year Ended 31 December 1971—*continued*

(c) *Consolidated Balance Sheet*

Year Ended 31 December 1970			Year Ended 31 December 1971	
$	$		$	$
	8,860,191	Fixed assets (at cost)— Land taken over or purchased		9,495,162
14,872,670		Buildings, including houses and camps	15,706,583	
15,851,837		Roads, bridges, tracks, etc.	17,073,917	
12,766,634		Plant and vehicles	13,591,229	
4,530,003		Other assets	4,811,078	
48,021,144			51,182,807	
13,123,060		*Less* provision for depreciation	13,526,585	
	34,898,084			37,656,222
		Development and management (net costs)—		
45,589,891		Balance as at 1 January 1971	48,599,128	
3,009,237		*Plus* net costs for the year	5,301,959	
	48,599,128			53,901,087
	771,525	Forestry Encouragement Loans		922,791*
		Current assets—		
4,472,375		Sundry debtors	4,279,281	
13,000		*Less* provision for bad debts (departmental mills)	13,000	
4,459,375			4,266,281	
3,113,409		Stocks and stores (at cost)	2,810,868	
	7,572,784			7,077,149
		Intangible assets—		
	27,787,025	Interest capitalised but not charged against specific assets		30,072,312
	$128,488,737	Total assets		$139,124,723
		Capital—		
45,756,017		National Development Loans	49,068,728	
3,312,711		*Plus* net payments for year	6,895,232	
	49,068,728			55,963,960
40,495,020		Consolidated Revenue Account	44,643,674	
9,330,201		*Plus* net payments for year	6,357,706	
49,825,221			51,001,380	
5,181,547		*Less* net deficit in General Administration Account	5,655,222	
44,643,674			45,346,158	
30,475,774		*Plus* accumulated interest on National Development Loans	32,839,009	
	75,119,448			78,185,167
		Accumulated profits and reserves—		
2,477,650		Profits of Waipa and Conical Hill sawmills	2,794,540	
350,412		Fire and other reserves	363,284	
	2,828,062			3,157,824
		Current liabilities—		
123,918		Cash held on deposits	138,368	
123,918		*Less* cash held against same	138,368	
	1,472,499	Sundry creditors		1,817,772
	$128,488,737			$139,124,723

*Approximately only half repayable in terms of Forestry Encouragement Loans Regulations 1967.

A. P. Thomson, Director-General.

B. J. G. Haker, Assistant Chief Accountant.

APPENDIX 16

New Zealand Forest Service: Statement of Payments and Receipts for the Year Ended 31 March 1972

(a) *Payments and Receipts*

1971	Item	1972
	Payments	
$ 212,735	Allocation of revenue: Local bodies	$ 224,234
	General management charges—	
8,203,231	Salaries	10,228,293
3,510,862	General expenses	3,340,061
436,665	Land purchase	494,918
	Forestry projects under development and management—	
14,265,420	Exotic	17,205,488
888,733	Indigenous	1,916,912
8,172,969	Sawmills, etc.	7,989,959
$35,690,615	Total	$41,399,865
	Receipts	
$	Indigenous forests—	$
1,328,158	Sales of standing timber	1,596,783
1,019,570	Log sales from managed forests	1,224,889
27,675	Miscellaneous	151,477
	Exotic forests—	
3,467,881	Sales of standing timber	2,264,938
8,167,837	Log sales from managed forests	11,991,469
421,098	Miscellaneous	430,464
	Sawmills, etc.—	
5,316,187	Sawn timber	5,461,756
436,963	Treated products	473,352
3,277,763	Miscellaneous	2,842,934
384,891	Miscellaneous credits	421,778
$23,848,023	Total	$26,859,840

(b) *Sources of Finance*

1971	—	1972
$		$
9,772,387	Consolidated Revenue Account expenditure	4,122,086
170,190	*Less* receipts	143,095
9,602,197	Required from Consolidated Revenue Account	3,978,991
25,918,228	Works and Trading Account expenditure	37,277,779
23,677,833	*Less* receipts	26,716,745
2,240,395	Loan moneys required	10,561,034
$11,842,592	Net finance required from Government funds	$14,540,025

APPENDIX 18

Production of Pulp and Paper in New Zealand

(Quantity in tons of 2,240 lb)

Year Ended 31 March	Wood Pulp			Fibreboard	Paper and Paperboard		
	Mechanical	Chemical*	Total		Newsprint	Other Paper and Paperboard	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1965 ..	203,372	193,029	396,401	31,736	184,317	126,809	311,126
1966 ..	217,743	193,181	410,924	33,771	195,606	153,548	349,154
1967 ..	205,345	223,860	429,205	32,878	183,886	170,435	354,321
1968 ..	221,159	252,442	473,601	33,075	195,546	175,931	371,477
1969 ..	230,975	255,000	485,975	38,288	199,530	189,994	389,524
1970 ..	241,110	311,882	552,992	39,553	204,137	234,816	438,953
1971 ..	254,858	312,065	566,923	43,653	210,538	244,048	454,586
1972 ..	258,478	312,975	571,453	44,807	214,577	246,805	461,382

*Includes semi-chemical pulp.

APPENDIX 19

New Zealand Production of Forest Products in Roundwood Equivalent and Actual Roundwood Removals for the Year Ended 31 March 1972

(Volume in million cubic feet)

Category	Indigenous Wood	Exotic Wood	Total
(1)	(2)	(3)	(4)
Logs for export	0.5	67.4	67.9
Chips for export	0.9	6.9	7.8
Sawn timber	29.2	110.7	139.9
Pulp and pulp products	1.8	77.2	79.0
Peelers, veneer, and plywood	0.8	2.3	3.1
Smallwood and miscellaneous	0.3	13.4	13.7
Total (roundwood equivalent)	33.5	277.9	311.4
Less waste used in pulp production—			
Sawmill residues	..	26.6	26.6
Waste paper	..	3.5	3.5
Total actual roundwood removed—			
1971–72	33.5	247.8	281.3
1970–71	35.8	253.6	289.4
1969–70	36.5	239.5	276.0
1968–69	36.1	207.2	243.3

Note—(1) Smallwood and miscellaneous is partly estimated. (2) Firewood is excluded. (3) Waste paper does not include broke or trimmings from producers' own machines.

APPENDIX 20

External Trade of New Zealand in Forest Products

(a) *Imports of Timber*

Calendar Year	Sawn Timber							Total Sawn Timber	Sleepers	Logs and Poles
	Hardwoods			Softwoods						
	Australian	Oak	Other	Douglas Fir	Redwood	Cedar	Other			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	(Volume in thousand board feet)									Thousand cu ft
1966 ..	7,636	141	5,879	4,957	4,188	12,587	1,672	37,060	2,238	689
1967 ..	5,651	12	4,671	3,430	2,944	7,464	1,556	25,728	10	569
1968 ..	4,123	96	2,939	2,044	1,590	4,628	950	16,370	114	515
1969 ..	4,197	72	4,576	1,781	3,022	4,836	781	19,265	27	467
1970 ..	4,391	102	6,670	2,684	1,815	4,958	327	20,948	2	506
1971 ..	4,241	18	4,253	1,556	824	3,225	367	14,484	..	443
	(Value in $(000))									
1966 ..	960	22	712	458	396	1,424	248	4,220	196	424
1967 ..	725	3	510	300	294	826	213	2,871	..	335
1968 ..	633	17	417	283	221	707	142	2,420	17	366
1969 ..	682	19	721	307	576	949	149	3,403	4	345
1970 ..	737	33	1,251	499	368	1,127	62	4,077	..	674
1971 ..	773	9	826	256	197	630	79	2,770	..	474

(b) *Exports of Timber*

Calendar Year	Indigenous			Exotic					Total Sawn Timber	Sleepers	Logs and Poles	Chips
	Beech	Other	Total	Radiata Pine		Douglas Fir	Other	Total				
				Sawn	Cases							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	(Volume in thousand board feet)										Thousand cu ft	b.d.u.*
1966	61	19	80	27,616	959	3,100	111	31,786	31,866	..	18,975	..
1967	68	438	506	32,236	2,134	4,397	321	39,088	39,594	..	28,106	..
1968	338	3,766	4,104	63,640	2,913	20,193	197	86,943	91,047	..	50,882	..
1969	447	3,766	4,213	74,400	2,423	24,887	549	102,259	106,472	14	59,032	..
1970	1,834	3,871	5,705	76,825	2,020	25,704	2,831	107,380	113,085	..	64,294	69,848
1971	1,048	2,489	3,537	91,825	1,217	26,818	5,409	125,269	128,806	7	64,315	85,466
	(Value in $(000))											
1966	8	4	12	1,706	106	232	10	2,054	2,066	..	4,744	..
1967	4	63	67	1,982	223	343	24	2,572	2,639	..	7,120	..
1968	50	548	598	4,130	490	2,147	13	6,780	7,378	..	16,507	..
1969	67	520	587	5,283	139	2,797	80	8,299	8,886	2	22,550	..
1970	229	761	990	6,218	250	2,920	320	9,708	10,698	..	24,830	1,793
1971	135	547	682	7,896	194	3,066	494	11,650	12,332	7	28,548	2,179

Source: Department of Statistics; prepared by the New Zealand Forest Service.

Note—The basis for valuation is: imports, c.d.v.; exports, f.o.b.

*b.d.u. = bone dry unit; 1 b.d.u. = 2,400 lb of oven dry wood.

APPENDIX 20—continued

EXTERNAL TRADE OF NEW ZEALAND IN FOREST PRODUCTS—*continued*

(c) *Imports of Pulp and Paper*

Calendar Year	Wood Pulp	Fibreboard	Paper and Paperboard		
			Newsprint	Other Paper and Paperboard	Total
(1)	(2)	(3)	(4)	(5)	(6)
	(Quantity in tons of 2,240 lb)				
1966	22,180	215*	2,026	25,406	27,432
1967	21,397	55*	776	19,030	19,806
1968	10,247	172*	677	24,130	24,807
1969	10,902	36*	775	18,460	19,235
1970	18,562	119*	486	27,715	28,201
1971	14,396	26*	485	19,439	19,924
	(Value in $(000))				
1966	1,944	10	222	7,462	7,684
1967	1,887	4	83	5,988	6,071
1968	987	8	109	7,834	7,943
1969	1,235	1	123	8,987	9,110
1970	3,260	3	80	10,150	10,230
1971	1,142	1	79	9,004	9,083

(d) *Exports of Pulp and Paper*

Calendar Year	Wood Pulp	Fibreboard	Paper and Paperboard		
			Newsprint	Other Paper and Paperboard	Total
(1)	(2)	(3)	(4)	(5)	(6)
	(Quantity in tons of 2,240 lb)				
1966	74,269	3,856*	110,670	2,397	113,067
1967	72,705	3,712*	107,681	3,804	111,485
1968	92,547	11,813*	117,701	17,448	135,149
1969	78,621	20,596*	118,438	26,872	145,310
1970	96,038	15,462*	116,705	26,032	142,737
1971	98,867	22,707*	124,881	17,833	142,714
	(Value in $(000))				
1966	6,148	150	11,482	420	11,902
1967	5,911	154	12,091	613	12,704
1968	6,864	431	16,093	2,490	19,014
1969	6,746	725	15,769	3,635	19,404
1970	9,127	653	15,276	4,521	19,797
1971	9,765	1,038	16,018	3,697	19,715

*In thousand square feet.

Source: Department of Statistics; prepared by the New Zealand Forest Service.

NOTE—(1) "Other Paper and Paperboard" excludes manufactures of paper and paperboard; values of "Other Paper and Paperboard" include minor items for which no quantities are given.

(2) Basis for valuation: imports, c.d.v.; exports, f.o.b.

BY AUTHORITY:
A. R. SHEARER, GOVERNMENT PRINTER, WELLINGTON, NEW ZEALAND—1972
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